PESTICIDES ABSTRACTS

February 1975 - Vol. 8, No. 2
Abstracts 75-0247-0502
PSTAB 08(02) 061-120 (1975)

U.S. ENVIRONMENTAL PROTECTION AGENCY

U.S. ENVIRONMENTAL PROTECTION AGENCY
OFFICE OF PESTICIDE PROGRAMS
TECHNICAL SERVICES DIVISION
Rm. EB-49, 401 M Street, S.W.
Washington, D.C. 20460

PESTICIDES ABSTRACTS (formerly Health Aspects of Pesticides Abstract Bulletin) is a monthly publication of the Technical Services Division of the Office of Pesticide Programs, Environmental Protection Agency.

The purpose of this publication is to foster current awareness of the major worldwide literature pertaining to the effects of pesticides as defined in the Table of Contents. The publication represents a monthly review of more than 2,000 primary and secondary sources. A list of periodicals from which articles have been abstracted appears annually in the January issue. Subjects and authors of abstracted articles are cross-referenced in quarterly and annual indexes. Reprint requests should be directed to the author of the complete article.

Publication of an abstract, annotation, or citation does not imply endorsement by the Environmental Protection Agency of the original article or of commercial materials, equipment, or processes mentioned therein.

CONTENTS

Volume 8 February 1975 No. 2

Page

General 61
(News items, letters, and editorials appearing in scientific and technical journals; information on production and use; and other items of general interest)

Monitoring and Residues 66
(Levels of pesticides in people or nonexperimental animals or in water, air, soil, food, feed, and other consumer products)

Epidemiology, Prevention and Treatment 77
(Frequency and distribution of pesticide poisoning in man or nonexperimental animals and treatment of clinical cases; morbidity and mortality; safety measures; decontamination; disposal of containers and wastes; legislation and regulations)

Toxicology and Pharmacology 84
(Toxicity studies in man and animals; effects on cells; organs, and systems; metabolic studies, biochemistry, interactions; antidotes and other treatment; mode of action. Ordinarily, articles dealing with efficacy studies are not included.)

Analysis 109
(Preparation of samples; analytical methods; instrumentation)

75-0247. Anonymous. **Arsenic makes a comeback.** *Brit. Med. J. 3(5929): 487; 1974.*

Arsenic has been largely replaced by selective herbicides and dips containing benzene hexachloride (BHC) for the control of weeds and the maintenance of sheep skin and fleece hygiene. However, while selective herbicides may be used safely in ordinary agriculture, the situation in forestry is entirely different: both weeds and seedling trees must be controlled. Thus, especially in the United States, toxic arsenic preparations are still being used in forestry. Despite various forms of protective clothing, workers seem to absorb considerable amounts of organic arsenic; none of these foresters have shown any symptoms of poisoning. Total urinary arsenic excretion is a better measure of exposure to arsenic than random tests of blood or urine. If arsenic compounds are still to be used, greater care must be taken in their use. A particular danger is the fact that dimercaprol is not very effective against inhaled arsenicals. New uses for arsenic are emerging, e.g., its incorporation into animal feed.

75-0248. Dafter, R. (Author address not given). **Chemicals and pest control.** *Chem. Ind. (London) 18: 714-715; 1974.*

The chances of researchers finding a successful new product in the field of pest control are about 10,000 to one. It can take from 6 to 7 years to develop a marketable product at a cost of several millions of pounds. Thus the only companies which have managed to survive in this field are the large international chemical groups. It is argued in Britain that the patent life of such products is too short to recoup the high expense of producing the chemical and that this period of protection should be extended. There is always a risk that a new product will be quickly offered as a replacement or substitute by inventive competitors. Prospects for expansion in this industry are as prodigious as has been its past growth. The need for agrochemicals in the United Kingdom itself shrinks to insignificance when compared to the world market. Thus, it is stressed that British companies in this field must be internationally minded if they are to survive. It is argued that the popular view of the agrochemicals industry as disrupting ecology is unfair and unwarranted.

75-0249. Hurtig, H. (Canada Dept. Agriculture, Ottawa, Ontario, Canada). **Chemicals in the environment. Some aspects of agricultural chemicals.** *Environ. Qual. Saf. 2: 88-99; 1973.* (5 references)

Mercury has mainly been used in Canadian agriculture for seed dressings, but has also seen some use as foliar sprays and aerosols in greenhouses. Use of the fungicide is decreasing. The presence of mercury levels higher than permitted in seed-eating game birds forced closing of the hunting season for 1 year. Serious economic loss has been incurred by fishermen who are limited to their sale of fish for human consumption to those containing less than 0.5 ppm. It was necessary in Alberta to conduct a public education program on the proper handling of treated seed, the necessity for secure covering of treated seed in transit and disposal of surplus seed properly. Mercury treated seed was not involved in the contamination of water or fish, nor has it caused an increase in soil contamination by mercury. In order to consider the role of pesticides as possible atmospheric pollutants, meaningful statistics concerning pesticide use must be obtained, there must be standard evaluation of spraying equipment, the magnitudes of the various fluxes by which pesticides leave and re-enter the wind field must be studied, adequate meteorological and pesticide flux data must be made available, and continued work is needed in the areas of pesticide particulate transport and numerical modeling of the deposition of pesticide droplets. A program for check sample analysis for mercury has gotten underway. The conclusion thus far is that the skill and experience of the analyst are the most important features required today for accurate analysis.

75-0250. Risebrough, R. W.; Devlin, R. M. (Univ. California, Berkeley, Bodega Bay, CA 94923; and Univ. of Massachusetts, East Wareham, MA 02538). **DDT, fact or fiction. DDT, response.** *Environ. Sci. Technol. 8(8): 686; 1974.* (6 references)

According to a Letter-to-the-Editor, the argument that PCBs could not be distinguished from DDT compounds and that many of the detrimental effects attributed to DDT might in fact be caused by PCBs has been refuted. Gas chromatographs of extracts of environmental samples readily distinguished the DDT group from the PCB compounds. There is also no evidence that DDE values reported by any reputable laboratories at any time have been exaggerated due to the presence of PCBs. Evidence in many species indicates a correlation between decreasing eggshell thickness and increasing DDE content. The accuracy of the methods used to detect DDT compounds in environmental samples cannot be questioned. A second letter states that there is considerable evidence to indicate a correlation between PCB content and eggshell thinning. Similarly there are several studies which indicate that PCBs are likely to interfere with DDE in chromatographic analyses.

75-0251. Gardiner, L. J. (Cent. Environ. & Man, Inc., Hartford, CT 06120). **More on DDT.** *Environ. Sci. Technol. 8(9): 779;1974.* (3 references)

While the lives of millions of human beings may have been saved by the use of DDT in the past, the lives of millions of human beings cannot continue to depend on DDT if the incidences of insect resistance continue to increase. In some cases, DDT resistance has hampered malaria control efforts. Resistant species have been found to date for the housefly, the human body louse, the bedbug, the German cockroach, the codling moth,

the corn earworm, the cabbage looper, at least 19 species of culicine mosquitoes, and at least 15 species of anopheline mosquitoes. The problems of analyzing for DDT residues are complicated by the fact that DDT can photodegrade to PCB through the intermediate, dichlorobenzophenone. DDT is not the only effective means of controlling the tussock moth; commercial tussock moth polyhedrosis virus and *Bacillus thuringiensis* preparations achieved 99% and 95% control, respectively, when applied aerially to forested land.

75-0252. Anonymous. **The strange case of the U. S. government vs. 2,4,5-T.** *Farm Chem. 137(8): 20-21; 1974.*

On June 24, 1974, the Environmental Protection Agency withdrew formal hearings on the cancellation of 2,4,5-T use on rice, rangeland, and rights of way. EPA stated that potential hazards have not been sufficiently demonstrated and, if 2,4,5-T is used according to label instructions, harmful effects should not occur. This reversal of the 1969 decision which prohibited 2,4,5-T use on food crops due to possible birth defects was brought about by the efforts of Dow Chemical, USDA, the American Farm Bureau Federation, The Weed Science Society of America, and other groups who pressed for a scientific decision on this widely used herbicide.

75-0253. Anonymous. **"Not official policy".** *Farm Chem. 137(8): 24-25; 1974.*

A lack of uniformity in the Environmental Protection Agency's approach to labeling pesticides highlights the need for internal guidelines for use in pesticide registration. The development of guidelines is being considered by the Office of Pesticide Programs. It is hoped that grouping of pests and possibly also of crops for registration purposes may occur in the future. Inspections conducted by the EPA concentrate on producers whose products have never been sampled by the EPA and on producers whose products have been found in the past to be in violation of the label. Inspections on the user level will be directed at those misuses which could cause serious damage to the environment. Steps to obtain label clearances should be speeded up in order not to discourage research into the development of new pesticides. It was suggested that data developed in foreign countries be admitted in support of domestic registration and that labels of pesticides cleared on major crops be extended to minor crops where possible.

75-0254. Heijbroek, W. (Biol. Dept., Inst. Modern Sugar Production, Bergen, The Netherlands). **Minimal usage of pesticides and alternatives for organochlorines.** *IIRB (Inst. Int. Rech. Betteravieres) 6(3): 127-137; 1973.* (9 references)

Dangers from unlimited use of pesticides may be somewhat reduced by introducing a system of pesticide usage which causes the least noxious side effects. The use of spray warning schemes or local applications could minimize the use of pesticides. Replacement of chlorinated hydrocarbons by less persistent chemicals should also be considered. For some of the sugar beet pests it is possible to forecast whether damage will occur by assessing the population development of the pest and observing the existence of natural predators. Field trials have resulted in a determination of the population level of the mangold fly at which crop losses can be expected. Based on data such as this, spraying schemes can be developed which lead to considerable decreases in the use of insecticides against this particular pest. Spray warning schemes for aphids and virus yellows have also been established.

75-0255. Berbenni, P. (Author address not given). **Inquinamento ambientale da "pesticidi". [Environmental pollution by pesticides.]** *Inquinamento 16(6): 3; 1974.* (Italian)

General environmental problems involved in the use of pesticides are discussed. Many pesticides, especially organochlorine derivatives, are especially hazardous due to their high stability and persistance in the environment, which results in contamination of soil, water, and food, and in their accumulation via the trophic chains. Massive deaths of fish in the Po river in Italy and impairment of the quality of rice crops due to the extensive use of herbicides were observed. Legal regulations issued in Italy in July and October, 1973 impose limitations on the use of DDT and prohibit the use of non-biodegradable pesticides, such as aldrin, and heptachlor. According to a recent proposal manufacturers should be required to furnish data on the composition, nature, toxicity, and trace analysis of new pesticide preparations to be marketed. Biological methods of pest control should be promoted at the expense of chemical control methods.

75-0256. Marchetti, R. (Amministrazione Provinc. di Pavia, Univ. Studi di Milano, Milan, Italy). **Pesticidi: aspetti generali del problema. [Pesticides: general aspects of the problem.]** *Inquinamento 16(6): 13-17; 1974.* (Italian)

General environmental and hygienic aspects of the use of pesticides are discussed. Apart from the hazards of acute poisoning, as exemplified by numerous accidents both in humans and the aquatic and avian fauna, pesticides may cause rarefaction and disappearance of certain animal species, especially birds, after prolonged exposure. They may reach very high concentrations in passing through trophic chains. Certain aquatic organisms are able to accumulate DDT at rates ranging from 2,000 to over 110,000. Certain pesticides, such as DDT, aldrin, and heptachlor yield metabolites that are

more toxic than the original compounds. The extensive and prolonged use of DDT has led to general contamination, as demonstrated by analysis of human body fat and human milk samples. Human milk may contain DDT residues far exceeding the maximum allowable concentration.

75-0257. Leonardi, A. (Ist. Ric. Farmacol. "Mario Negri", Milan, Italy). **Erbicidi: attentato alla salute. [Herbicides: crime against health.]** *Inquinamento 16(6): 21-23; 1974.* (2 references) (Italian)

General health aspects of pesticides and the hazards involved in the uncontrolled use and development of pesticides are described. An increased incidence of serious hepatic lesions of the precirrhotic type was observed in workers occupationally exposed to DDT for at least 6 years. DDT was found to interfere with certain enzymes responsible for the metabolism of drugs such as barbiturates. Therefore, the sensitivity of the population of industrialized countries polluted by DDT to barbiturates is different from the normal sensitivity. Dichlorvos was found to be mutagenic under certain conditions in laboratory tests. Chronic exposure to pesticides at the levels present in food may cause disturbances in hematopoiesis, while certain pesticides are nephrotoxic and interfere with genes and with spermatogenesis. Some 80% of all cases of cancer are believed to be due to pollution in general.

75-0258. Croce, G. (Pretura di Abbiategrasso, Italy). **Fenomenologia della degradazione d'ambiente in referimento all'attivita agricola. [Environmental damage as a function of agricultural activity.]** *Inquinamento 16(6): 24-27; 1974.* (Italian)

The role of agricultural activity in the degradation of the environment is described. Agriculture and livestock farming are impaired by industrial and domestic emissions and effluents; and conversely, agricultural activity, e.g., in the form of pesticide application, is responsible for environmental contamination and damage. Much of this damage is far-reaching, uncontrollable, and even unpredictable, as demonstrated by the presence of pesticide residues in aquatic organisms far from inhabited areas. The widespread and indiscriminate use of pesticides, especially of herbicides, particularly when the latter are meant to replace mechanical weed control, will result in the loss of the self-purifying capacity and sterilization of the soil, in loss of humus, and serious degradation of the soil.

75-0259. Ceppi, G. (Valle Lomellina, Pavia, Italy). **(Letter.)** *Inquinamento 16(6): 27-28; 1974.* (Italian)

Observations on the remarkable effects of 2,4-D and possibly other herbicides in Valle Lomellina, Italy are reported. Desiccation, destruction, and complete failure of crops following the use of the herbicides were observed in vegetable gardens. One worker complained of headache and nausea following the distribution of the herbicide. Allergic dermatitis with squamous lesions of the limbs, allergic hypersensitivity, rhinitis, dermatitis, and urticaria were diagnosed in other workers following distribution of the herbicides. The observations call for stricter control over pesticide production.

75-0260. Schneiderman, H. A. (Cent. Pathobiol., Univ. California, Irvine, CA 92664). **Insect hormones and insect control.** *Insect Juvenile Hormones, Chemistry and Action. Proceedings of Symposium, Washington, D.C., Sept. 12-17, 1971, pp. 3-27.*

The principal hormones used by insects to regulate their development are considered, along with the effects, mechanisms of action, and biological assays for the detection of these hormones. Certain features of insect hormone action which must be understood if insect growth regulators are to be effectively used as agents of pest and vector control are explored. These include: the point in the life history of the insect during which these agents should be applied for effective destruction or sterilization; their spectra of insect targets; organisms other than insects which may be affected by insect hormones; and the possible development of resistance to hormone treatment.

75-0261. Pimentel, D. (Dept. Entomol., Cornell Univ., Ithaca, NY 14850). **Extent of pesticide use, food supply, and pollution.** *J. N. Y. Entomol. Soc. 81(1): 13-33; 1973.* (92 references)

Only 5% of the United States' total crop acres receive insecticide treatment, and about half of that is applied to cotton and tobacco acres. Despite large increases in insecticide use, crop losses due to insect pests are also increasing, and amount to about 13% at present. These trends are partially due to the practice of substituting insecticides for sound bioenvironmental pest controls and partially due to higher consumer standards. If pesticides were not used, crop losses would increase by about 7%. Except for apples, peaches, and onions, most food crops would not be seriously affected by discontinuing the use of pesticides. Although pesticides should not be eliminated, crops should be treated only when necessary, aircraft spray drift should be reduced, and sound bioenvironmental controls should be reactivated. The prime danger associated with pesticide toxicity is to those who apply the chemicals. Available data on the long-term, low-level effects of pesticides on public health are inconclusive. Existing levels of pesticide pollution have already been responsible for kills among some species of beneficial insects, fishes, and birds. A systems approach to pest management, in which the multiple factors of pests, crop culture, costs, benefits, and environmental and health risks are evaluated is suggested.

75-0262. Mel'nikov, N. N. (All-Union Sci. Res. Inst. Chemical Plant Protection Agents, USSR). **Pestitsidy i okruzhayushchaya sreda (soyedineniya rtuti). [Pesticides and the environment (mercury compounds).]** *Khim. Sel. Khoz. 12(2): 114-117; 1974.* (21 references) (Russian)

Studies on the sources, metabolism, and dynamics of mercury as an environmental contaminant are reviewed. Mercury in water originates mainly from industrial effluents and pesticides, and accumulates in aquatic organisms. Accumulation is especially high in fish, in which mercury levels of 0.1-0.7 mg/kg are commonly measured, while up to 12.13 mg have been found in pike and burbot. The rate of mercury uptake by plants from soil is low, ranging from less than 1% to 3%, depending on the soil type and the plant species as well as on the type of mercury compound involved. Methylmercury dicyandiamide was more easily absorbed by tomato from soil than was panogen or mercuric chloride. The mercury concentration introduced into the soil with dressed seeds amounts to 0.0003-0.0006 mg/kg; it totals 0.006-0.012 mg/kg after consecutive introduction for 20 years, which indicates that the role of this type of contamination is negligible. When present in the soil, organomercurial fungicides are decomposed to metallic mercury which either evaporates or becomes bound in insoluble compounds. Although the contribution of agricultural pesticides to the overall environmental contamination by mercury is rather modest, organomercurial seed dressing agents should be replaced by less toxic and persistent preparations.

75-0263. Anonymous. **Les pesticides dans le monde moderne. [Pesticides in the modern world.]** *Phytoma 250:31-34; 1973.* (16 references) (French)

The modern approach to pest control and the importance and feasibility of integrated control of insects and diseases are described. New chemical pesticides should be developed with respect to the requirements for increased selectivity, reduced persistence, and high efficiency. Biological pest control is currently underway using *Rodolia cardinalis*, *Cactoblastis cactorum*, and *Bacillus thuringiensis*. Integrated pest control calls for intensification of studies on repellents, attractants, and chemosterilants, including pheromones and juvenile hormone. The presently known chemosterilants may be carcinogenic, which makes their use problematic. Integrated pest control by the combination of different chemical, biological, and physical methods should be able to unbalance the biological equilibrium of the pest to be controlled without undue damage to the ecosystem as a whole and without harmful effects on man.

75-0264. Koller, R. (Dragonerstrasse 44, A4600 Wels, Austria). **Der Einfluss der Insektizide (Pestizide) auf die Fruchtbarkeit der Haustiere. [The influence of insecticides (pesticides) on the fertility of domestic animals.]** *Prakt. Tierarzt 55(7): 380-381; 1974.* (German)

Problems of the influence of pesticides on the reproductive functions and fertility of animals are discussed. Organochlorine pesticides, such as DDT, may be more hazardous in chronic exposure than in acute poisoning, since exposure to small quantities for extended periods of time may result in latent pathological changes due to accumulation. These changes may interfere with the function of the enzyme and endocrine systems, affecting reproductive processes such as gametogenesis and lactation, and ultimately leading to latent forms of sterility or teratogenesis. Prolongation of the estrous cycle and considerable reduction of the rate of implantation were observed in mice following oral administration of small doses of insecticides. Reduction of pesticide usage and promotion of biological control would alleviate the threat to animal reproduction.

75-0265. Watters, F. L. (Canada Dept. Agriculture, Winnipeg, Manitoba, Canada). **Storage problems in developing countries.** *Proc. N. Cent. Br. Entomol. Soc. Amer. 28: 178; 1974.*

Poor storage structures and a lack of people with adequate knowledge about storage pests and their control contribute to losses in quality and quantity of food in many non-industrialized, developing countries. Spectacular improvements in the situation have come about through the use of stored grain protectors containing either lindane or malathion dust formulations. Intensive use of insecticide sprays in storage warehouses and in stacks of bagged commodities led to the development of resistant strains of insects. More emphasis on warehouse hygiene and more discriminating application of chemicals should reduce food losses and delay the onset of insect resistance to insecticides. Such programs require specialized training in developing countries and more emphasis on demonstration projects.

75-0266. Humphrey, A. E. (Coll. Engineering Appl. Sci., Univ. Pennsylvania, Philadelphia, PA). **The use and misuse of science and technology.** *Proc. Roy. Aust. Chem. Inst. 41(8): 167-171; 1974.*

Chemical pest control was clearly advanced by the use of DDT, but many of the unintended consequences of such use are even now not fully comprehended. Evidence is accumulating that DDT may be harmful enough in the long term to force abandonment of its use as a chemical agent. The instability of the ecology in the United States is increasing and efforts must be made to make our closed system of life stable again. The indirect consequences on society of scientific innovations must be more carefully considered in the future. Long-term implications and effects must be anticipated if possible and careful decision-making as to the final outcome must be employed before chemical advancements are put into general use.

75-0267. Galowalia, M. M. S. (Univ. Mauritius, Reduit, Mauritius). **Some aspects of insect-pest control by chemicals.** *Rev. Agr. Sucr. Ile Maurice 52(2): 73-77; 1973.* (2 references)

In determining what approach to use in an insect pest problem, both the traits of the insect pest to be eradicated and the characteristics peculiar to the specific ecological system where the operation is to be carried out must be studied. Ecosystems can be either stabilized or non-stabilized. The former consist of areas under forest, and the latter type includes agricultural lands or agroecosystems. Not all insects present in a crop ecosystem are harmful. One should aim at only the target pest, preserving as much of the rest of the ecosystem as possible. In stabilized and semi-stabilized agroecosystems the emphasis should be on control based on biological principles. In less stabilized agroecosystems, selective application of an insecticide is likely to give better results. In unstabilized agroecosystems there is more dependence on chemical control. One great problem in insecticide application is overdosing. Overdosing can cause phytotoxicity, kill natural parasites and predators of the target insect, increase levels of risk to humans, threaten wildlife, and generally disrupt the ecosystem.

75-0268. Monteverde, H. A. (Asuntos Internacionales, Secretaria de Salubridad y Asistencia, Mexico). **Contaminacion ambiental. [Environmental pollution.]** *Salud Pub. Mexico 15(2): 263-265; 1973.* (Spanish)

General problems of environmental contamination and its relationship to public health are discussed. Environmental pollution, a result of increased industrialization and urbanization, has brought about changes in the natural equilibrium of the taxonomic composition of the environment. Pesticides used in agriculture were found to destroy species such as birds and fish that need protection. Also, pesticides penetrate into the trophic chains and thereby indirectly endanger human health due to food contamination. To prevent the development of resistant species of mosquitoes, antimalarial preparations should be used exclusively for malaria control in areas where mosquitoes are still susceptible to these preparations.

75-0269. Heuer, B.; Yaron, B.; Birk, Y. (Agr. Res. Org., Inst. Soils Water, Bet Dagan, Israel). **Guthion half-life in aqueous solutions and on glass surfaces.** *Bull. Environ. Contam. Toxicol. 11(6): 532-537; 1974.* (3 references)

Pure and radioactive azinphosmethyl (guthion) buffered at pH 8.6, 9.6, or 10.7 was maintained in aqueous solutions or on glass beads for up to 25 days at 6° C, 25° C, or 40° C. In aqueous solution, the degradation of guthion, as measured by gas chromatography, increased with increasing pH and temperature. At pH 8.6 and 6° or 25° C, the half-life of guthion in water was about 1 month. At pH 9.6 or 10.7 and 6° or 25° C, the half-life was less than 1 week, and at pH 9.6 or 10.7 and temperature 40° C, the half-life was less than 1 day. At all temperatures, guthion was decomposed at a slower rate on dry glass beads than on glass beads having a 50% moisture content. In the fomer case, a "lag period" was observed between the pesticide incubation and the beginning of the degradation process; this "lag period" was presumably not a biological effect. In the presence of 50% moisture, the "lag period" was observed only at 6°C.

75-0270. Ramachandran, M.; Sharma, M. I. D.; Sharma, S. C.; Mathur, P. S.; Aravindakshan, A.; Edward, G. J. (Nat. Inst. Communicable Dis., Delhi-6, India). **DDT and its metabolites in human body fat in India.** *Bull. WHO 49 (6): 637-638; 1973.* (6 references)

DDE and the *o,p'*- and *p,p'*-isomers of DDT were assayed in 94 human biopsy fat samples from hospitals in Delhi by gas chromatography. DDT was present in all except 2 samples at concentrations from 0.17 to 176.5 mg per kg of body fat. The average total DDT content was 21.8 ± 2.9 mg/kg, of which 45.9% was DDE. The average value reported in a similar study in 1965 (24.3 mg/kg, of which DDE constituted 39.7%) was not significantly different from the present value, indicating that the DDT storage status has not since undergone any significant change. (Author abstract by permission)

75-0271. Schumacher, H. G.; Parlar, H.; Klein, W.; Korte, F. (Inst. Oekol. Chem., Gesellsch. Strahlen-Umweltforsch. mbH, Munich, Germany). **Beitraege zur oekologischen Chemie LV. Photochemische Reaktionen von Endosulfan. [Contributions to ecological chemistry part 55. Photochemical reactions of endosulfan.]** *Chemosphere 2(2): 65-68; 1973.* (6 references) (German)

The photochemical reactions and metabolism of α- and β-endosulfan in *n*-hexane/acetone, dioxane/water, and in the gaseous phase were studied by UV irradiation at wavelengths over 300 n·n. Irradiation in solutions revealed the possibility of dechlorination in the four different theoretical positions. One of the reaction products of α-endosulfan was dechlorinated at the double bond. Dechlorination at the dichloromethylene linkage was observed in dioxane/water. Endosulfan sulfate and a photoisomer of β-endosulfan were obtained in the gaseous phase. Endosulfan alcohol, endosulfan ether, and endosulfan lactone as well as two other products and a dehydrated substance were formed, probably due to hydrolysis or irradiation of the solid substance on the walls of the reaction vessel.

75-0272. Parlar, H.; Korte, F. (Inst. Oekol. Chem., Techn. Univ. Munich, Freising-Weihenstephan, Germany). **Beitraege zur oekologischen Chemie LX. Zur Photochemie der Chlordanderivate. [Contributions to ecological chemistry Part 60. Photochemistry of chlordane derivatives.]** *Chemosphere 2(4): 169-172; 1973.* (4 references) (German)

The photolysis of β-chlordane and 1-hydroxy-dihydrochlordene in acetone at wavelengths over 300 nm was studied. The irradiation of β-chlordane resulted in photoisomerization and formation of another reaction product. Similar reactions also yielding a different substance were observed during the irradiation of 1-hydroxy-dihydrochlordene. The photolysis of these chlordane derivatives is interpreted as a multistep free radical process whose first phase is characterized by the homolytic split of a C-H or C-Cl bond. However, hydrogen abstraction with formation of a homoallyl radical can also be considered. The IR, NMR, and mass spectra of the products obtained are discussed.

75-0273. Watkins, D. A. M. (Long Ashton Res. Sta., Univ. of Bristol, Long Ashton, Bristol, England). **Photolysis of methyl benzimidazol-2-ylcarbamate.** *Chemosphere 3(5): 239-240; 1974.* (6 references)

Both benomyl and thiophanate-methyl decompose in aqueous solution to the fungitoxic compound methyl benzimidazol-2-ylcarbamate (BCM, carbendazim). The behavior of BCM was investigated in sunlight and in solutions irradiated by UV light. Thin deposits on glass plates were exposed to sunlight for several months; the UV spectra of the resulting samples showed distinct changes, but the amount of material was too small to permit separation and identification. UV irradiation of BCM in methanol produced a clear suspension within 4 days. Evaporation of the solution gives a yellow, water-soluble solid. On addition of ammonia to the methanol distillate, a white precipitate formed; it was identified as oxamide. Dimethyl oxalate was also present in the distillate. The yellow solid contained unchanged BCM, dicarbomethoxyguanidine, monocarbomethoxyguanidine, and, probably, an acid salt of guanidine.

75-0274. Wallace, R. R. (Univ. Waterloo, Waterloo, Ont., Canada). **The effects of methoxychlor (1,1,1-trichloro-2,2-bis(*p*-methoxyphenyl)ethane) on, and the accumulation of methoxychlor in, some insects of running waters.** *Diss. Abstr. Int. 35(5): 2149B; 1974.*

In the Chalk River, the dispersion of

methoxychlor and Rhodamine B dye was studied using fluorometry and chromatographic analyses. Accumulation of methoxychlor was studied in laboratory and field experiments. The numbers of Simuliid larvae drifting as a result of treatment with an oil solution of methoxychlor (0.79 μ g/l for 15 minutes) reached a maximum 60 min after the beginning of treatment at stations 275 m and 550 m downstream from the treatment point. No methoxychlor could be detected in larvae or moss collected from the Chalk River before treatment. Drifting larvae caught after the treatment contained residues ranging from 0.24 to 2.57 mg/kg larvae. Residues of methoxychlor were detected in moss and grasses in the stream up to 8 weeks after treatment. Residues ranged from 7.4 to 34.6 μg/kg (wet weights). Laboratory experiments indicated that Simuliid larvae concentrated particulate formulations of methoxychlor more efficiently than ethanol formulations. Residue values reached as high as 2310 μg/kg. Trichoptera larvae concentrated methoxychlor to levels as high as 1563 μg/kg. Ethanol formulations were concentrated to higher levels than particulate formulations by Trichoptera. Methoxychlor treatment also caused copious drift of dead and dying insects in the Speed River and in the Quebec streams examined. (Author abstract by permission, abridged. The thesis is available for consultation at the University of Waterloo Library.)

75-0275. Bocharova, L. P.; Khuriye, A. Zh. (Author address not given). **Dinamika ostatkov sayfosa v gorokhe. [Dynamics of sayfos residues in peas.]** *Dokl. TSKhA (Timiryazev. Sel'skokhoz. Akad.) 182: 121-126; 1972.* (6 references) (Russian)

The dynamics of sayfos (menazon) residues in different parts of pea plants and seeds were studied. Sayfos was used for seed dressing in doses of 0.5 and 1 kg/100 kg, and for spraying before flowering at rates of 1 and 2 kg/ha. The sayfos residue in peas decreased from nearly 0.5 mg/kg to 0.005 mg/kg within about 20 days in June. Both peas and straw contained sayfos residues below the maximum allowable levels when the pesticide was used according to the official recommendation.

75-0276. Lis, S. A.; Hopke, P. K. (Dept. Chem., Princeton Univ., Princeton, NJ 08540). **Anomalous arsenic concentrations in Chautauqua Lake.** *Environ. Lett. 5(1): 45-51; 1973.* (11 references)

Samples of water were taken weekly over a 16 week period from 6 sites in Chautauqua Lake, New York. In the summer of 1971 the average level of dissolved arsenic in the lake was 15.1 ppb; range, 3.5 to 43.3 ppb. One possible source of arsenic is the residue from large-scale use of sodium arsenite as an herbicide during 1955-1963. During the arsenite spraying period the concentrations of arsenic from water samples taken varied: values between 1.1 and 6.0 ppm in 1956 reached levels of 9.5 ppm in 1957 and 14.6 ppm in 1958. No arsenic was present in sediment samples collected from the sprayed areas at the time of spraying. Neutron activation analyses of lake sediments in 1972 showed that arsenic concentrations then ranged from 6 to 70 ppm. The arsenic apparently became associated with the lake's sediments as a consequence of the herbicide use and is being slowly released, thus accounting for above average levels of dissolved arsenic in the lake's waters. Experiments indicate that the release of arsenic from sediments occurs more readily under conditions of low levels of dissolved oxygen. It is suggested that the sediment-bound arsenic in Chautauqua Lake is probably in the form of arsenate ion.

75-0277. Kahanovitch, Y.; Lahav, N. (Tahal, Water Planning for Israel, Tel-Aviv, Israel). **Occurrence of pesticides in selected water sources in Israel.** *Environ. Sci. Technol. 8(8): 762-765; 1974.* (8 references)

Gas chromatography was used to determine the concentrations of 12 organic pesticides in selected water samples taken from various parts of Israel during the period 1972-73. The only samples which did not contain pesticides were those from the Dan River and the drainage water from agricultural fields. In most of the samples, pesticide concentrations on the order of several nanograms per liter were found. The most widespread compounds were lindane and α-BHC, with *o,p'*-DDD (TDE), *p,p'*-DDT, dieldrin, and endrin being found in small quantities in some samples. The relatively high concentrations of lindane in municipal sewage samples indicate that this is an important source of BHC in the water bodies under investigation. The relatively low and constant pesticide levels in Lake Kinneret and the other water reservoirs probably reflects the buffering action of the bottom sediment of these bodies.

75-0278. Grasso, C.; Bernardi, G.; Martinelli, F. (Ist. Igiene, Univ. Firenze, Florence, Italy). **Il significato della presenza di insetticidi clorurati nel sangue di neonati e delle rispettive madri. [A gas-chromatographic study of chlorinated pesticides in newborns' and their mothers' blood.]** *Ig. Mod. 66(4): 362-371; 1973.* (18 references) (Italian)

Thirty-five blood samples taken from newborn babies and their respective mothers in the provinces of Florence and Arezzo, Italy, were analyzed for *p,p'*-DDT, DDE, DDD (TDE), lindane, heptachlor, heptachlor epoxide, aldrin, and dieldrin by gas chromatography. Relatively high levels (up to 0.6 ppm) were found in all 70 blood samples. Both DDE and DDD were detected in all samples in substantially lower concentrations. Lindane, heptachlor, and aldrin were detected in the majority of the blood samples. Heptachlor epoxide, as well as metabolites of heptachlor and aldrin, were detected in only a few samples. The relatively close correlations between the residue levels in the blood samples of the newborn babies and their mothers suggest that

placental transfer of organochlorine pesticides occurs. The pesticide levels were highest in premature, stillborn, and underweight babies.

75-0279. Singh, K.; Gulati, K. C.; Dewan, R. S. (Indian Agr. Res. Inst., New Delhi, India). **Persistence of disyston residues in soil and plant.** *Indian J. Agr. Sci. 42(12): 1135-1138; 1972.* (5 references)

Disyston (disulfoton, 5% granules) applied to furrows at the rate of 0.5, 1.0, and 1.5 qt. per 30-cm row for the control of shoot-fly maggots (*Atherigona varia-soccata* Rond.) on sorghum, left residues of 0.076, 0.025, and 0.97 ppm respectively after 56, 54, and 64 days. No detectable disyston residues were found in the soil 63 days after application in 1967 and 85 days after application in 1968, when 5% disyston granules were applied to the soil at a rate of 1.5 qt per 30-cm row. The residues disappeared much earlier from plots treated with lower concentrations than from those treated with 1.5 qt/30 cm. Enzymatic and colorimetric methods were equally efficient for detecting very low disyston residues, although the enzymatic method was more accurate at residue levels below 2 ppm.

75-0280. Dejonckheere, W.; Kips, R. H. (Lab. Fytofarm., Rijksuniv. Gent, Ghent, Belgium). **Residu's van pesticiden op groenten en fruit. [Pesticide residues on vegetables and fruit.]** *Ingenieursblad 43(20): 605-610; 1974.* (14 references) (Dutch)

General hygienic and toxicological problems of pesticide residues in and on vegetables and fruit, and results of residue analyses carried out during recent years are presented. While it is desirable to eliminate all residues of pesticides from food in view of the lack of knowledge on their effects on future generations, maximum allowable residue concentrations in food are determined on the basis of such parameters as the LD50 value, the no-effect level, and the maximum allowable daily intake. Thiram, zineb, endosulfan, and quintozene do not leave residues in excess of the tolerance level when used as recommended. Benomyl is metabolized in plants into the fairly persistent BCM (carbendazim). About 80% of all residues present are contained in the outer leaves of lettuce. Pollard pellets from Argentina were found to be contaminated with hexachlorobenzene (HCB), BHC, *p,p'*-DDT, *o,p'*-DDT, and DDD (TDE).

75-0281. Pawson, B. A.; Scheidl, F.; Vane, F. (Hoffmann-La Roche Inc., Nutley, NJ 07110). **Environmental stability of juvenile hormone mimicking agents.** *IN: Insect Juvenile Hormones, their Chemistry and Action. Proceedings of a Symposium. Washington, D.C., Sept. 12-17, 1971. p. 191-214.* (6 references)

In order to use the spraying method for applying juvenile hormone mimicking agents, thus leaving a thin film on the plant foliage, the agent so used must withstand heat, sunlight, air, and climatic conditions. The effects of these environmental factors were studied on a mixture of isomers of insect juvenile hormones. When exposed to UV light, more than 95% of the starting material disappeared after 24 hr. Under conditions of a visible heat lamp at 40°C, 85% of the starting material remained after 24 hr and 65% remained after 96 hr. To determine the effect of UV exposure on the activity of the juvenile hormone, a topical test was performed on *Tenebrio molitor* pupae. The activity of the synthetic mixture after exposure to sunlight for 16 hr was about 1/10 that of a mixture not so exposed. In a comparison of the activities of the four pure isomers of this juvenile hormone mimicking agent, the more active compounds were those with the *trans* orientation of the double bond, and the less active were those with the *cis* orientation. The phytotoxic properties of the four isomers and a mixture thereof were evaluated on sugar beets, corn, wheat, soybeans, cotton, and tomatoes. Plant injury was the same in all cases, typified by slight necrosis.

75-0282. Ivie, G. W.; Dorough, H. W.; Alley, E. G. (Vet. Toxicol. Entomol. Res. Lab., Agr., Res. Serv., College Station, TX 77480). **Photodecomposition of mirex on silica gel chromatoplates exposed to natural and artificial light.** *J. Agr. Food Chem. 22(6): 933-935; 1974.* (17 references)

Exposure of mirex to sunlight or ultraviolet light as deposits on silica gel thin-layer chromatoplates resulted in its slow degradation to several products. Photoproducts characterized include Kepone hydrate, a monohydromirex derivative previously identified (1,2,3,4,5,5,6,7,9,10,10-undecachloropentacyclo-[5.3.0.$0^{2,6}$.$0^{3,9}$.$0^{4,8}$]decane), and 1,2,3,4,6,7,9,10,10-nonachloropentacyclo-[5.3.0.$0^{2,6}$.$0^{3,9}$.$0^{4,8}$]decan-5-one, isolated as the hydrate. Because certain of the mirex photoproducts are considerably more polar than either mirex or its monohydro derivative, any environmental degradation of mirex via these paths would possibly result in enhanced biodegradability and a reduced tendency toward storage and accumulation in adipose tissues. (Author abstract reprinted by permission of the American Chemical Society)

75-0283. Dejonckheere, W. P.; Kips, R. H. (Dept. of Crop Protect. Chem., Fac. Agr. Sci., Rijksuniv. Gent, Ghent, Belgium). **Photodecomposition of methidathion.** *J. Agr. Food Chem. 22(6): 959-968; 1974.* (16 references)

Irradiation of methidathion was carried out with ultraviolet light of a wavelength of 254 mμ. The photoproducts were isolated and purified with different

systems of TLC and by comparison of their infrared and mass spectra with the spectra of synthesized samples. The following products were identified: the P=O analog; *O,O,S*-trimethyldithiophosphonic acid; *O,O,S*-trimethylthiophosphonic acid; *O,O,O'O'*-tetramethyl-*S,S*-methylbis(dithiophosphonic) acid; 2-methoxy-4-methylthiomethyl-Δ^2-1,3,4-thiadiazolin-5-one; 2-methoxy-Δ^2-1,3,4-thiadiazolin-5-one; 2-methoxy-4-methyldithiomethyl-Δ^2-1,3,4-thiadiazolin-5-one; bis(2-methoxy-Δ^2-1,3,4-thiadiazolin-5-on-4-yl) disulfide; 1,3,4-oxodiazolindine-2,5-dione. (Author abstract reprinted by permission of the American Chemical Society)

75-0284. Archer, T. E. (Dept. Environ. Toxicol., Univ. California, Davis, CA 95616). **Dissipation of parathion and related compounds from field-sprayed spinach.** *J. Agr. Food Chem. 22(6): 974-977; 1974.* (3 references)

Parathion in the form of Thiophos Parathion 4 E.C. was applied at two rates, 1 and 0.5 lb/acre of active ingredient, to spinach in the field 14 days preharvest. Sampling was at daily intervals from time of application through harvest and the plant material was extracted immediately after sampling for residue analysis. The samples were analyzed for levels of parathion, paraoxon, aminoparathion, *S*-ethylparathion, *S*-phenylparathion, *p*-nitrophenol, *O,O*-diethyl phosphate, and *O,O*-diethyl phosphorothioate. All residues declined from application through harvest. The total initial residues were approximately 58 and 25 ppm and at harvest 0.5 and 0.3 ppm for the 1 and 0.5 lb/acre of active ingredient, respectively. The percentage of paraoxon, *p*-nitrophenol, and diethyl phosphate in the total residue increased from application to harvest while parathion percentage decreased for both applications. (Author abstract reprinted by permission of the American Chemical Society)

75-0285. Berck, B. (Canada Dept. Agr., Res. Sta., Winnipeg, Manitoba, Canada, R3T 2M9). **Fumigant residues of carbon tetrachloride, ethylene dichloride, and ethylene dibromide in wheat, flour, bran, middlings, and bread.** *J. Agr. Food Chem. 22(6): 977-984; 1974.* (35 references)

Dowfume EB-5, consisting of carbon tetrachloride, ethylene dichloride, and ethylene dibromide (CT, EDC, and EDB) in 63:30:7 w/w proportions, was applied to 1000 bu (27.3 metric tons) of wheat stored in a paper laminate bin. The CT-EDC-EDB distribution-persistence patterns were monitored at 16 bin locations over a 14-day period by GC and hydrogen flame ionization detection. CT gas concentrations were greatest at the bottom, the descending order of magnitude being bottom, middle, top, headspace. EDB gas concentrations, and those of EDC to a lesser extent, were greatest in the headspace-top interface, the descending order of magnitude being the reverse of CT. Fumigant residues in wheat, in the flour, bran, and middlings derived from wheat, and in bread baked from the flour, were determined over a 7-week period of fumigant exposure by GC with EC detection. Amounts of unchanged CT and EDB as small as 0.01 ng could be detected. EDC residues could not be satisfactorily removed or determined. CT and EDB residues of the wheat varied, depending on the bin location and contact time, and ranged from 3.2 to 72.6 ppm of CT, and from 0.0 to 3.3 ppm of EDB. CT and EDB residues of bran and middlings were greater than those of flour, and ranged from 0.2 to 2.23 ppm of CT and 0 to 0.4 ppm of EDB. No EDB residues were found in any portion of the bread tested. CT residues in bread ranged from 0 to 0.04 ppm. (Author abstract reprinted by permission of the American Chemical Society)

75-0286. Stewart, D. K. R.; Cairns, K. G. (Res. Sta., Canada Agr., Kentville, Nova Scotia B4N IJF, Canada). **Endosulfan persistence in soil and uptake by potato tubers.** *J. Agr. Food Chem. 22(6): 984-986; 1974.* (3 references)

Studies on technical endosulfan incorporated into soil at a rate of 6.7 kg/ha showed that α-endosulfan decomposed fairly rapidly (50% in ~60 days) with the simultaneous formation of equivalent amounts of endosulfan sulfate which appeared to be relatively stable in soil. β-Endosulfan disappeared slowly (~50% in 800 days). Residues in potato tubers due to direct absorption from the soil, in the same season that endosulfan was applied at 6.7 kg/ha, were 0.3 ppm of endosulfan sulfate, 0.06 ppm of β-endosulfan, and 0.01 ppm of α-endosulfan in peel and 0.03 ppm of endosulfan sulfate in pulp. Eight foliar sprays, each applied at the rate of 0.6 kg/ha, resulted in residues of 0.01 ppm of endosulfan sulfate in peel and pulp. (Author abstract reprinted by permission of the American Chemical Society)

75-0287. Schuth, C. K.; Isensee, A. R.*; Woolson, E. A.; Kearney, P. C. (Agr. Environ. Qual. Inst., Agr. Res. Cent., U.S. Dept. Agr., Beltsville, MD 20705). **Distribution of ^{14}C and arsenic derived from [^{14}C]cacodylic acid in an aquatic ecosystem.** *J. Agr. Food Chem. 22(6): 999-1003; 1974.* (9 references)

The distribution, accumulation, and degradation of the arsenical herbicide [^{14}C]hydroxydimethylarsine oxide ([^{14}C]cacodylic acid) was investigated in aquatic ecosystems containing three soil types, water, algae (*Oedogonium cardiacum*), duckweed (*Lemna minor* L.), snails (*Physa* sp.), daphnia (*Daphnia magna*), catfish (*Ictalurus punctatus*), and crayfish (*Procambarus clarki*). After cacodylic acid incorporation, soils were flooded with 80 l. of water and allowed to incubate for 7 days, and ^{14}C and arsenic contents were determined intermittently in each component over the 60-day experimental period. ^{14}C from cacodylic acid increased in the water phase during the first 30-50 days of the experi-

ment, reached a plateau, and finally delcined. Accumulation of ^{14}C in aquatic organisms was quantitatively larger than arsenic accumulation, thus indicating degradation of cacodylic acid to various arsenical compounds in the aquatic ecosystem. Crayfish and snails contained higher arsenic and lower ^{14}C residues than algae, duckweed, and snails. Approximately 5, 31, and 48% of the arsenic initially added to the three soils was lost during the experiment. Bioconcentration ratios suggest that cacodylic acid does not accumulate greatly in the aquatic environment. (Author abstract reprinted by permission of the American Chemical Society)

75-0288. Ruzo, L. O.; Zabik, M. J.*; Schuetz, R. D. (Pestic. Res. Cent., Dept. Chem. and Entomol., Michigan State Univ., East Lansing, MI 48824). **Photochemistry of bioactive compounds. 1-(4-Chlorophenyl)-3-(2,6-dihalobenzoyl)ureas.** *J. Agr. Food Chem. 22(6): 1106-1108; 1974.* (7 references)

The photoproducts obtained upon irradiation at 300 nm of 1-(4-chlorophenyl)-3-(2,6-dichlorobenzoyl)-urea (I) and 1-(4-chlorophenyl)-3-(2,6-difluorobenzoyl)-urea (II) in methanol solution and in the solid phase were identified. Photolysis of I yielded *p*-chlorophenyl isocyanate, *N*-4-chlorophenyl methylcarbamate, *N*-phenyl methylcarbamate, 2-chlorobenzamide, and 2,6-dichlorobenzamide. The photoproducts of II were identified as *p*-chlorophenyl isocyanate, *N*-4-chlorophenyl methylcarbamate, *N*-phenyl methylcarbamate, and 2,6-difluorobenzamide. Mechanistic pathways are examined and discussed. The possibility of a type II disproportionation is considered. (Author abstract reprinted by permission of the American Chemical Society)

75-0289. Woods, R. J.; Akhtar, S. (Dept. Chem. and Chem. Eng., Univ. Saskatchewan, Saskatoon, Saskatchewan, Canada). **Radiation-induced dechlorination of chloral hydrate and 1,1,1-trichloro-2,2-bis(*p*-chlorophenyl)ethane (DDT).** *J. Agr. Food Chem. 22(6): 1132-1133; 1974.* (6 references)

Chloral hydrate and DDT, present in low concentrations in aqueous media, are dechlorinated by moderate doses of γ-radiation. Oxygen and relatively high concentrations of organic material reduce, but do not completely inhibit, chloral hydrate dechlorination. (Author abstract reprinted by permission of the American Chemical Society)

75-0290. Vega, L. A.; Chavarria, P. L. (Lajas Substa., Agron. Dept., Univ. Costa Rica, Costa Rica). **Mobility and persistence of atrazine and metribuzin in four soils from Puerto Rico.** *J. Agr. Univ. P. R. 58(3): 379-380; 1974.* (2 references)

Greenhouse experiments were conducted to determine the initial inactivation, mobility in irrigated soils, and persistence of atrazine and metribuzin (Bay 94337). The soil tested was a sand containing 81% silicates, primarily quartz, and 18.4% calcareous materials. Oats were seeded in soils treated with various amounts of herbicide and the green weights and growth curves compared to determine the amount of herbicide present in the soil. Atrazine was less phytotoxic than metribuzin in sand and four other soils. The initial inactivation of atrazine, due mainly to adsorption, was equal in all soils, while the initial inactivation of metribuzin was greater in Fraternidad and Coto clay soils than in San Anton and Toa clay loams. Inactivation in the latter case was positively correlated with the clay content and negatively correlated with the exchangeable potassium content. Both herbicides showed greater mobility in the soil when increasing amounts of water were applied, the degree of mobility being affected by the type of soil tested. Atrazine was more persistent than metribuzin in all but the Fraternidad soil. The degradation of metribuzin was different in the different soils.

75-0291. Addison, R. F.; Ackman, R. G. (Bedford Inst. Oceanography, Dartmouth, Nova Scotia, Canada). **Removal of organochlorine pesticides and polychlorinated biphenyls from marine oils during refining and hydrogenation for edible use.** *J. Amer. Oil Chem. Soc. 51(5): 192-194; 1974.* (18 references)

The fate of polychlorinated biphenyl residues was studied in a series of marine oils before and after processing to margarine stock. Samples of normal production runs of several marine oils from reduction of fish scrap, whole fish, or seal blubber were obtained from commercial producers. Samples of the raw and refined oils were analyzed for organochlorine residues. All raw oils contained residues of DDT and DDT derivatives, totaling 2-8 ppm. Dieldrin was present in some raw oils at 0.02 ppm. No residues of the DDT group or dieldrin were found in processed oils. The minimum detectable levels were about 0.02 ppm each for the DDT group and about 0.01 ppm for dieldrin. Aroclor 1254 was found in raw oils but not in processed oils where the minimum detectable level was 1 ppm. Perchlorination of the processed oils did not yield any detectable decachlorobiphenyl, limit of detection 0.5 ppm. Thus, the polychlorinated biphenyl levels which had originally been present in raw oils were reduced significantly by complete processing.

75-0292. Lavee, S.; Martin, G. C. (Dept. Pomology, Volcani Cent., Bet Dagan, Israel). **Ethephon (1,2-^{14}C(2-chloroethyl)phosphonic acid) in peach fruits. I. Penetration and persistence.** *J. Amer. Soc. Hort. Sci. 99(2): 97-99; 1974.* (16 references)

Surface decomposition, penetration, and translocation of ^{14}C-labeled 2-chloroethyl phosphonic acid were studied in the peach. The tree which was to be treated reached full bloom on March 7, and developing

fruits were treated on May 15 and a second set on June 23. Only one side of each fruit was treated. Fruit treated on May 15 was sampled 21, 45, 70, and 95 days post-treatment. Less than 1.8% of the radioactivity applied was recovered from the entire fruit 65 days after treatment. A considerable amount of radioactivity was still present on the exocarp, a large portion of which could be washed off by a stream of cold water with very little penetration into the exocarp and mesocarp. Little translocation was detected and significant activity was found only at the treated areas. Most of the radioactivity remaining was due to unchanged 2-chloroethyl phosphonic acid. The results suggest that the active degradation of the compound takes place in the young fruit while in the older peach fruits, degradation takes place at a slower rate.

75-0293. Goerlitz, D. F.; Law, L. M. (Menlo Park, CA). **Distribution of chlorinated hydrocarbons in stream-bottom material.** *J. Res. U.S. Geol. Surv. 2(5): 541-543; 1974.* (13 references)

The distribution of some chlorinated hydrocarbons was studied in bed material samples gathered from selected surface streams which had been contaminated with high levels of the compounds investigated. Separate fractions of each sample were analyzed. Analysis of the water used for fractionation showed a loss of less than 1% of the chlorinated hydrocarbon to the aqueous phase. The expectation that the greatest concentration of chlorinated hydrocarbons in the various fractions would be related to the surface area, i.e., on the finer material, was not always correct. The greatest amounts of the subject compounds were found in the coarser fractions of 4 of the samples. Although surface area was generally related to sorption, notable exceptions occurred. The complexity of bottom material samples is such that the distribution of chlorinated hydrocarbons may be controlled to a major extent by the organic matter and associated organisms. Physical and mineralogical considerations may be of less importance. This investigation shows that all particle-size fractions must be considered if a representative bed-material sample is to be collected and quantitatively related to a stream.

75-0294. Hori, Y.; Tankawa, Y.; Yamamoto, I.; Kawai, Y.; Shitara, Y.; Sato, Y.; Mori, K. (Hokkaido Inst. Public Health, Sapporo, Hokkaido, Japan). **[Studies on agricultural chemicals in foods, part 4. Pesticide residues in vegetables and fruits produced in Hokkaido in 1973.]** *Hokkaidoritsu Eisei Kenkyusho-Ho (Rep. Hokkaido Inst. Pub. Health) 24: 117-121; 1974.* (2 references) (Japanese)

One hundred thirty-three specimens consisting of 19 species of vegetables and fruits were analyzed for pesticide residues such as α-, β-, γ-, and δ-BHC, *p,p'*-DDT, *p,p'*-DDE, *p,p'*- DE, aldrin, dieldrin, endrin, heptachlor, and heptachlor epoxide by extraction, liquid-liquid partition, clean-up with Florisil column, and gas chromatography. Residues of DDT and BHC were very low in newly analyzed lettuce, grape, pea, and Japanese radish (root). Endrin and dieldrin were found in only one sample of Japanese radish. DDT, BHC, and polychlorocyclodienes in fruits and legumes were very low; BHC and DDT in vegetables were very low except in spinach. The yearly change of pesticide residues was not so remarkable in rice and spinach (total BHC) as in general, and generally speaking, the yearly decrease of residues of total DDT and dieldrin was remarkable. Pesticide residues in spinach and cucumber must be traced in the future.

75-0295. Hori, Y.; Tankawa, Y.; Yamamoto, I.; Kawai, Y.; Shitara, Y.; Sato, Y.; Mori, K. (Hokkaido Inst. Public Health, Sapporo, Hokkaido, Japan). **[Studies on agricultural chemical residues in foods, part 5. Pesticide residues in dairy products and meats produced in Hokkaido in 1973.]** *Hokkaidoritsu Eisei Kenkyusho-Ho (Rep. Hokkaido Inst. Pub. Health) 24: 122-125; 1974.* (4 references) (Japanese)

Ten specimens of commercial milk, five specimens of butter, three specimens of conditioned powdered infant formula, six specimens of chicken eggs, four specimens of poultry and pork, and two specimens of beef were analyzed for α, β, γ, and δ-BHC, *p,p'*-DDT, *p,p'*-DDD, *p,p'*-DDE, aldrin, dieldrin, endrin, heptachlor, and heptachlor epoxide. The analytical results show that residues of BHC and DDT in chicken eggs were relatively low; however, endrin was detected in all specimens although in trace amounts and dieldrin was detected in some specimens. Levels of BHC and DDT were relatively high (0.12-0.33 ppm total BHC, 0.06-0.42 ppm total DDT); those of pesticides in powdered milk and commercial milk were generally low; however, when calculated on a fat basis, these values were equal to those in butter. As the fat content in meats fluctuated, the pesticide residues were high in high-fat meat. Generally poultry and pork were relatively rich in DDT and poor in BHC, but beef was low in BHC and DDT. The residue level (BHC, DDT) in butter showed no decrease as compared to the values of 1972.

75-0296. Saito, M.; Kitayama, M. (Hokkaido Institute of Public Health, Sapporo, Hokkaido, Japan). **[Studies on the prevention of poisoning due to agricultural chemicals, part 19. Organochlorine pesticide residues in water and soil.]** *Hokkaidoritsu Eisei Kenkyusho-Ho (Rep. Hokkaido Inst. Pub. Health) 24: 126-127; 1974.* (2 references) (Japanese)

Water specimens of 10 rivers flowing in paddy fields and soil specimens from the river beds were analyzed for pesticide residues such as α-, β-, γ-, and δ-BHC, *p,p'*-DDT, *p,p'*-DDE, *p,p'*-DDD, *o,p'*-DDT, aldrin, endrin, and dieldrin in 1973. DDT, aldrin,

dieldrin, and endrin were not detected in water, but a very small amount of BHC was detected in all but one specimen of water. Residues of α-BHC averaged 0.126 ppb and those of γ-BHC averaged 0.274 ppb. BHC, aldrin, dieldrin, and endrin were not detected in all soil specimens; however, 0.008-0.027 ppm of *p,p'*-DDE and *p,p'*-DDD was detected in three soil specimens. The residue of BHC in river water suggested some illegal application, but the residue of DDT (including DDE and DDD) was considered to be due to their persistence.

75-0297. Zhukova, P. S.; Botvin'eva, A. M. (Belorussian Sci. Res. Inst. Fruit, Vegetable, and Potato Production, USSR). **Effektivnost' eptama, piramina i betanala na posevakh stolovoy svekly i ikh ostatochnyye kolichestva v pochve i rasteniyakh. [The effectiveness of eptam, pyramine and betanal in red beet fields and their residues in soil and plants.]** *Khim. Sel. Khoz. 12(7): 53-56; 1974.* (2 references) (Russian)

The weed-control efficiency and residue dynamics of eptam (EPTC), pyramine, (pyrazon) and betanal (phenmedipham) in red beet fields were studied. When applied in normal doses, these herbicides did not interfere with the nitrate nitrogen, mobile phosphorus, and exchangeable potassium levels in the soil, and did impair the quality of the crops. When applied in doses of 0.75 and 1.5 kg/ha, betanal was no longer detectable in the soil after 77 days, with the residue levels found after 51 days accounting for 10.5% and 22.5% of the input, respectively. When applied in doses of 4 to 8 kg/ha, eptam was largely decomposed in the soil in over 2 months, and no residues were detectable in red beets harvested on or after Sept. 20.

75-0298. Kono, S. (Hyogo Prefect. Agr. Exp. Sta., Akashi, Hyogo, Japan). **[Studies on the absorption (residue) of diazinon in spinach, strawberry, and onion.]** *Kinki-Chugoku Nogyo Kenkyu (Kinki-Chugoku Agr. Res.) 488: 64-66; 1974.* (10 references) (Japanese)

In fields artificially polluted with soils containing diazinon at 100, 50, 10, 1.0 and 0.1 ppm, three kinds of crops, spinach, onion, and strawberry, were grown. Spinach was harvested 73 and 135 days after sowing; strawberry was harvested 168 and 190 days after diazinon application; onion was harvested 190 days after diazinon application. Analyses of the crops showed that the residue of diazinon after 73 days of sowing was 21.2 (0.89), 15.6 (0.55), 14.2 (0.27), 1.7 (0.08), and 0.10 (0.006) ppm in the root and aerial parts of spinach respectively in the fields with 100, 50, 10, 1.0 and 0.1 ppm. However, the residues had declined to less than 0.1 ppm in every field after 135 days and the residue in strawberries was always less than 0.1 ppm. No residue of diazinon was found in onion except for less than 0.001 ppm in the field with 100 ppm of diazinon. The percent absorbed decreased as the initial content of diazinon in the soil increased, indicating a saturation state.

75-0299. Srivastava, A. S.; Singh, S. P.; Srivastava, K. M. (Div. Entomol., U. P. Inst. Agr. Sci., Kanpur, India). **Deterioration of malathion residue on brinjal leaves (*Solanum melongena*).** *Labdev Part B 10(3-4): 160-162; 1972.* (5 references)

Malathion (0.02%, 0.04%, 0.06%, and 0.08%) was sprayed on 1-month-old flowering brinjal plants. Leaf samples taken after 24 hours, 72 hours, 7 days, 15 days, and 1 month were analyzed colorimetrically for malathion residues. The percent disappearance of the pesticide from the leaves after 3, 7, and 15 days was 35.68-47.62, 47.75-59.70, and 81.33-83.36, respectively. Residues of 44-86 ppm were found on the 24-hour samples, while those on the 72-hour samples were 23-45 ppm. After 7 days the residues were 22-35 ppm, and after 15 days they were 7-14 ppm. There were no detectable residues after 1 month.

75-0300. Leistra, M. (Lab. Res. Insecticides, Wageningen, The Netherlands). **Quantitative description of pesticide persistence and mobility in soil.** *Meded. Fac. Landbouwwetensch. Rijksuniv. Gent 38(3): 769-774; 1973.*

Pesticide behavior in soil can be simulated by computer models. Three examples are given. The first example concerns the persistence of a herbicide in the top layer of soil which is influenced by the fraction of the applied amount still present, distribution in the soil, and sensitivity of subsequent crops to the residue. In the second example the evaporation of a soil fumigant is considered with emphasis on the dissipation processes involved. The third model presented discusses the leaching of a persistent and mobile compound from the upper part of the soil. Toxicologically based limiting values for concentration-time products for pesticides and important breakdown products in the various environment phases are needed.

75-0301. Greve, P. A. (Lab. Toxicol., Nat. Inst. Public Health, Bilthoven, The Netherlands). **Pentachlorobenzene as a contaminant of animal feed.** *Meded. Fac. Landbouwwetensch. Rijksuniv. Gent 38(3): 775-784; 1973.* (2 references)

Pentachlorobenzene was identified in 15 samples of wheat and wheat products used for the preparation of animal feed. The amounts of pentachlorobenzene correlated with those of hexachlorobenzene, also present in these samples. Hexachlorobenzene, used as a fungicide, was probably contaminated with pentachlorobenzene. Pentachlorobenzene contamination was scarcely noted during a study of animal fat, eggs, and meat products. However, 8 samples of pork fat which originated from one farm were contaminated; the hogs had been fed with fodder which included imported hexachlorobenzene-treated spinach seed. Fodder samples from this farm contained as much as 45 ppm hexachlorobenzene and 3.7 ppm pentachlorobenzene. Penta-

chlorobenzene was found in samples of chicken fat also contaminated by hexachlorobenzene; the amounts of pentachlorobenzene varied between 7 and 15% of the hexachlorobenzene content. It was suggested that the chickens had also been fed with fodder in which hexachlorobenzene-treated seed was present and that the pentachlorobenzene had entered into the fat as a co-contaminant of the hexachlorobenzene. The multiplication factor of pentachlorobenzene in hogs is not known at present. The processing in animal feed of seed which has been treated with either compound must be stopped.

75-0302. Fraselle, J. V.; Martens, P. H. (Fac. Sci. Agron., Gembloux, Belgium). **Le probleme des residus en relation avec les traitements fongicides appliques contre les maladies tardives du froment d'hiver. [Problems of residues in relation to fungicide treatment for late diseases of winter wheat.]** *Meded. Fac. Landbouwwetensch. Rijksuniv. Gent 38(3): 865-874; 1973.* (6 references) (French)

Fungicide treatment of winter wheat and fungicide residues in grains and straw of winter wheat were studied. The fungicides used on a large scale to control the late diseases of winter wheat were ethirimol, tridemorph, chloraniformethane, dinocap, benomyl, methyl thiophanate, carbendazim, maneb, zineb, mancozeb, and propineb. The fungicide residues found in the grains and straw of winter wheat, usually after three treatments, were generally very small or undetectable in most cases, due to the small doses applied; to the rather long lapse between the last treatment and harvest, usually amounting to 40 days; and to the fact that the grains are protected by the glumes until harvest.

75-0303. Steurbaut, W.; Dejonckheere, W.; Kips, R. H. (Lab. Fytofarm., Fac. Landbouwwetensch., Rijksuniv. Gent, B-9000, Ghent, Belgium). **Fate of thiram and zineb on early autumn and spring glasshouse lettuce.** *Meded. Fac. Landbouwwetensch. Rijksuniv. Gent 38(3): 875-889; 1973.* (4 references)

Different treatments of thiram and zineb (dust and spray formulations) were applied to lettuce. The residue tolerance limit in Belgium (3 ppm) was not exceeded on early autumn lettuce for thiram (4 doses at 20 g each, wet powder; or 2 doses at 200 g each, dust) when the last treatment was applied three weeks before harvest. Residue tolerance limits (3 ppm) were not exceeded on early autumn lettuce for zineb (2 doses at 200 g each, wet powder or dust) with the last treatment occurring four and three weeks, respectively, before harvest. Results are similar for spring glasshouse lettuce. Determinations of the residues on individual heads of the same sample and the differences between inner and outer leaves of the heads confirm that the residue is distributed very unequally over different plants of the same sample and that the major part of the residue is found on the outer leaves.

75-0304. Martens, P. H.; Zenon-Roland, L. (Fac. Sci. Agron., Gembloux, Belgium). **Residus de captafol sur laitues. [Captafol residues on lettuce.]** *Meded. Fac. Landbouwwetensch. Rijksuniv. Gent 38(3): 891-898; 1973.* (4 references) (French)

Captafol residues were studied on lettuce treated with this pesticide. Lettuce plants were dusted on two or three occasions. The captafol residue levels were dependent on the properties of the actual formulation and the time of application. Rain after application reduced the residue content on the leaves. Residue levels were much higher on the lower than on the top leaves.

75-0305. Wambeke, E. van; Vanachter, A.; Temmerman, L. de; Assche, C. van (Lab. Fytopathol. Plantebescherming, Katholieke Univ., Louvain, Belgium). **Problemen rond sclerotiniarot in de witloofgroeven en het pentachloornitrobenzeen-residu in het eetbaar produkt. [Chicory rot in chicory beds and residues of pentachloronitrobenzene in the marketable crop.]** *Meded. Fac. Landbouwwetensch. Rijksuniv. Gent 38(3): 899-910; 1973.* (9 references) (Dutch)

Pentachloronitrobenzene (PCNB), methyl thiophanate, and methylbenzimidazole carbamate (carbendazim) residues were studied in leaves and roots of chicory treated with these pesticides. With or without methylthiophanate, PCNB left behind residues substantially higher than the new residue standard of 0.01 ppm in both leaves and roots. The high residue levels along with the high persistence of this pesticide make it unsuitable in chicory beds. While the residue levels were always below 0.175 ppm, they were highest when PCNB, applied at rates of 5, 2.5 and 1.25 g/m^2 m, was distributed by the pour-on method; the residues were lower in dusted plants. The residue level was lowest when the preparation was applied into the soil. The carbendazim residues were below the maximum allowable level.

75-0306. Steurbaut, W.; Dejonckheere, W.; Kips, R. H. (Lab. Fytofarm., Fac. Landbouwwetensch., Rijksuniv. Gent, B-9000, Ghent, Belgium). **Fate of benomyl on early autumn and spring lettuce.** *Meded. Fac. Landbouwwetensch. Rijksuniv. Gent 38(3): 917-928; 1973.* (10 references)

Application of 20 g benlate (50% benomyl) per 100 m^2 to early autumn lettuce 5 weeks before harvest gave a residue of 1-2 ppm at harvest time. A split application (2 doses of 10 g each benlate) respectively 5 and 3 weeks before harvest resulted in a higher residue level, 6 ppm. For spring lettuce, treatment with 20 g benlate resulted in 0.2 ppm residue 9 weeks after application, but a split application (2 doses of 10 g each) still showed a greater residue, 2.2 ppm, 6 weeks after application. Following each treatment, a rapid decline of methyl-benzimidazol-2-ylcarbamate (carbendazim) concentration occurs, but after a week the curve flattens. It is suggested that, by this time, transport from the soil to

the plant compensates for breakdown of the residue on the plant surface. Marked differences in concentration between outer leaves and the rest of the plant are noted, but are not so great as with zineb and thiram treatments. The UV spectrophotometric method, based on the work of Mestres, appears easiest and has similar reproducibility to the colorimetric method or the bioautographic technique.

75-0307. Habegger, M.; Sprenger, M. (Knorr Naehrmittel AG, Zurich, Switzerland). **Modellversuche ueber den Verbleib von Pestiziden in Milke und Quark, ausgehend von kuenstlich kontaminierter Magermilch. [Experimental model to evaluate carry-over of pesticides in whey and curds from artificially contaminated skim milk.]** *Mitt. Geb. Lebensmittelunters. Hyg. 64(2): 262-265; 1973.* (4 references) (German)

The carry-over of organochlorine pesticides, such as DDT, dieldrin, lindane, DDE, and DDT into whey and curd during the manufacture of cottage cheese or cream cheese from contaminated skim milk was investigated by gas chromatographic analysis. At a sensitivity of detection amounting to 0.001 ppm, no pesticide residues were detected in whey, which means that the bulk of the residues was carried over into the curd fraction. The results show the following affinity preference for pesticides in dairy products: fat, protein, and water. Calculating the pesticide content in relation to the fat content seems therefore problematic, especially when dealing with low-fat and formulated dairy products.

75-0308. Engst, R.; Knoll, R. (Author address not given). **Rueckstandsbildung in Eiern nach Lindan-Begasung von Legehennen. [Residue formation in eggs after fumigation of laying hens with lindane.]** *Nahrung 16(5): 592; 1972.* (German)

Eggs from hens fumigated with lindane in a concentration of 0.35 g/m^3 were analyzed for pesticide residues by gas chromatography with electron capture detector. Lindane residues sharply increased in the eggs following fumigation, and were well in excess of the maximum allowable concentration of 0.5 ppm. Residues fell below the tolerance limit 15 days after fumigation. Besides lindane, *p,p'*-DDT, *p,p'*-DDE, and, in a few cases, *p,p'*-DDD (TDE) were found in the eggs. However, the total DDT content was below the maximum allowable concentration of 0.3 ppm.

75-0309. Wagner-Rugenstein, H. (Author address not given). **Untersuchungsergebnisse ueber DDT-Gehalt von Milch- und Milcherzeugnissen als Folge der aviochem. Bekaempfung von Rapsschaedlingen. [Results of the study of DDT content of milk and milk products as a result of the aerochemical control of rape pests.]** *Nahrung 16(5): 597-598; 1972.* (German)

A sharp increase in the DDT and lindane contents was observed in milk and milk products due to drift of preparations containing them following aviochemical control of rape pests. Residue levels in milk and milk samples collected from that area prior to aviochemical treatment were below the tolerance levels, and the high residue contents measured following treatment dropped only slowly to tolerable levels. To avoid such contamination, adequate training of the personnel, replacement of DDT and lindane by less persistent preparations, further development of less persistent pesticides, and especially the use of decay catalysts and agents preventing drift are discussed.

75-0310. Thurm, V. (Hygiene-Institut Wernigerode, Wernigerode, DDR). **Untersuchungen ueber Pestizidrueckstaende auf Tabakwaren. 2. Mitt. Zum Insektizidgehalt von Rohtabaken. [Studies on pesticide residues on tobacco products. Part 2. On the insecticide content of raw tobaccos.]** *Nahrung 18(4): 445-449; 1974.* (6 references) (German)

Results of pesticide residue analyses of raw tobaccos from East Germany, USA, Italy, Greece, Bulgaria, Albania, India, Sumatra, Philippines, Java, Paraguay, and Brazil are presented. While none of the samples contained organophosphorus pesticides, which is most probably due to their low persistence, all samples were contaminated with organochlorine pesticides. Apart from DDT residues ranging from 0.12 to 79.2 ppm, DDE, dieldrin, endrin, thiodan (endosulfan), lindane, aldrin, methoxychlor, and PCBs were found in greatly varying quantities depending on the country of origin. Significant correlations were established between the residue levels in the raw tobacco and blending formulas and in the finished products. Proper selection of raw tobaccos appears to be suitable for reducing the residue level in the finished products.

75-0311. Suett, D. L. (Nat. Vegetable Res. Sta., Wellesbourne, Warwick, England). **Uptake of chlorfenvinphos and phorate from soil by carrots as influenced by mode of application and cultivar.** *Pestic. Sci. 5(1): 57-71; 1974.* (20 references)

Granular formulations of chlorfenvinphos and phorate were applied to sandy loam soil at 2 kg a.i./ha either broadcast and incorporated to 2.5 cm, broadcast and incorporated at 10 cm,or by the bow-wave method along the carrot rows. Depth of incorporation did not influence the rates of residue decline in the soil. Bow-wave applications produced the highest residues in root and foliage and also reduced the rate of oxidation of phorate. 30 weeks after sowing the carrots, all treatments gave the highest residue concentrations in the uppermost 6 cm of carrot root. The peel of carrots grown in the soil treated to a depth of 10 cm contained 88% and 23% of the total chlorfenvinphos and phorate residues resepectively. Significant differences were found in the residue concentrations in five carrot cultivars

treated with chlorfenvinphos and phorate by the bow-wave method at 1.5 kg a.i./ha. The concentrations were inversely correlated with root size so the amounts of insecticide (μg/carrot) were similar in all cultivars. Prolonged growth of cv. Norfolk Giant slightly extended the period of uptake of chlorfenvinphos, but the uptake of phorate was ultimately less than its rate of dissipation. Neither the method of application nor the selection of carrot cultivar extended the period of uptake very greatly but differences which were obtained in residue concentrations in the carrot may become significant in the event of regulatory control of residue levels. (Author abstract by permission)

75-0312. Abdalla, N.; Raski, D. J.; Lear, B.; Schmitt, R. V. (Dept. Nematol., Univ. California, Davis, CA 95616). **Movement, persistence, and nematicidal activity of a pesticide containing 1,3-dichloropropene in soils treated for nematode control in replant vineyards.** *Plant Dis. Rep. 58(6): 562-566; 1974.* (12 references)

1,3-D (982.8, 1310.4, 1638, 1872, 1872 + 468, and 936 + 468 liters per hectare) was applied, using deep placement and split-depth application techniques, to replant vineyard soils for the control of nematodes. When 1872 + 468 l/ha was used, the concentrations were sufficient for nematode kill at the 1-foot depth. However, soil samples taken 2 years after application at a depth of 0 to 91.5 cm were free from nematodes. Nematodes (*Xiphinema americanum, Paratylenchus* sp., and *Tylenchorhynchus* sp.) were recovered from untreated areas at these depths. The distribution of the chemical in the gas phase in the soil atmosphere at different depths was measured by gas chromatography. Higher doses, low soil moisture, and coarser soil texture resulted in higher concentrations of the gas at deeper soil levels.

75-0313. Waller, J. B.; Dahm, P. A. (Iowa State Univ., Ames, IA 50010). **Phorate loss from Iowa soils as affected by time, temperature and soil sterilization.** *Proc. N. Cent. Br. Entomol. Soc. Amer. 28: 171; 1973.*

The fate of phorate was determined in 3 types of Iowa soil: Clarion, Webster, and Harps. Time, temperature and soil sterilization effects were studied. Five g of soil were incubated with 0.5 ml 10^{-4} *M* phorate which approximates current usage rate of 2 lb/acre. Incubations were carried out at 10, 20, and 30°C for periods up to 16 days. After 2 days at 30°C, 85% of the added phorate was lost: about 30% by adsorption to the soil, 35% by oxidation to the sulfoxide, and 20% by oxidation to the sulfone. More phorate was recovered from autoclaved soil than from gamma-irradiated or chemically sterilized (sodium azide; diethyloxydiformate) soil. Chemical methods were as effective as gamma-irradiation in preventing phorate loss, but subsequent incubation of chemically treated soils showed they were not sterile. Loss of phorate from Iowa soil is a complex process. Some phorate is adsorbed, thioether oxidation by soil microorganisms occurs, and some non-biological conversion to sulfoxide takes place. It is suggested that long term protection afforded to the growing plant comes from thioether oxidation products rather than from phorate.

75-0314. Smith, A. E. (Agr. Canada, Regina Res. Sta., Regina, Saskatchewan, S4P 3A2, Canada). **Degradation of trichloroacetic acid in Saskatchewan soils.** *Soil Biol. Biochem. 6(3): 201-202; 1974.* (3 references)

The persistence of ^{14}C-trichloroacetic acid at rates equivalent to 4.4 kg/ha, the highest recommended application rate in Western Canada for control of green foxtail, was studied in 3 soil types at different moisture contents. Following soil extraction with 0.1*M* calcium chloride solution, radiochemical analytical procedures were used to monitor the breakdown. It was determined that no detectable traces of calcium chloride soluble degradation products were formed in any soils, and thus all the ^{14}C-extracted from the soils could be attributed to ^{14}C-trichloroacetic acid. The disappearance of the ^{14}C-trichloroacetic acid from all 3 soils at the higher moisture regime showed a similar trend, with little breakdown occurring during the first few weeks of incubation, but with breakdown increasing later. Loss of ^{14}C-trichloroacetic acid was most rapid in high organic silty clay, with almost complete breakdown after 3 weeks at the higher moisture regimes. Degradation was slower in the sandy loam and heavy clay. In all cases, at moistures close to the wilting point, over 50% of the applied chemical could be recovered after 7 weeks. It was concluded that trichloroacetic acid carry-over from one growing season to the next should not be a problem in the soil types studied.

75-0315. Schultz, I. R.; Fleeker, J. R. (Dept. Biochem., North Dakota State Univ., Fargo, ND). **Persistence and degradation of the fungicide 1,2-bis(3-methoxycarbonyl-2-thioureido)benzene in soil.** *Proc. N. Dak. Acad. Sci. 27(1): 31; 1973.*

Degradation of the experimental fungicide 1,2-bis(3-methoxycarbonyl-2-thioureido)benzene (TD-1771) in loamy fine sand and silty clay soils was studied. The fungicide was converted to 2-methoxycarbonylaminobenzimidazole in both cases. The conversion was complete within 10 days at 10 ppm and 20°. The benzimidazole was degraded at a much slower rate than the parent compound. A second degradation product of undetermined structure was detected.

75-0316. Baluja, G.; Franco, J. M.; Murado, M. A. (Sec. Plaguicidas y Contaminaction Ambiental, Inst. Quim. Organ. Gen., Madrid, Spain). **Contaminacion del medio por plaguicidas organoclorados. VII. Residuos de insecticidas y PCB en especies terrestres y fluviales y su signi-**

ficado en la contaminacion del medio ecologico nacional. [Environmental contamination by organochlorine pesticides. VII. Insecticide and PCB residues in terrestrial and aquatic species and their significance for the contamination of the national ecology.] *Rev. Agroquim. Tecnol. Aliment. 14(2): 229-245; 1974.* (13 references) (Spanish)

Organochlorine pesticide and PCB residues were examined in *Esox lucius, Sturnus unicolor, Lumbricus* sp., *Barbus barbus, Chondrostoma polylepsis, Notrix* sp., *Helix* sp., *Lacerta* sp., *Otus scops, Luscinia megarryncus, Saxicola torquata, Serinus serinus, Locustella luscinioides, Cyprinus carpio,* and *Passer domesticus* captured in Spain. The alpha-BHC, lindane, aldrin, dieldrin, and total DDT levels in *Sturnus unicolor* were in the respective ranges of 0.001-0.14 ppm, 0.015-0.14 ppm, 0.001-0.046 ppm, 0.001-0.04 ppm, and 0.036-0.25 ppm. The PCB levels were too low to be determined quantitatively. The total BHC levels determined in *Esox lucius* averaged 0.06 ppm in the muscles, 0.066 ppm in the liver, and 0.063 ppm in the gills. The aldrin plus dieldrin levels were 0.001 ppm in the muscles, 0.045 ppm in the liver, 0.024 ppm in the kidney, and 0.008 ppm in the gills. With alpha-BHC and lindane levels below 0.001 ppm, aldrin levels at 0.01-0.1 ppm, *p,p'*-DDE and *p,p'*-DDD (TDE) levels below 0.1 ppm, *p,p'*-DDT levels below 0.5 ppm, and PCB levels between 30 and 50 ppm in the water, the alpha-BHC, lindane, aldrin, dieldrin, *p,p'*-DDE, *p,p'*-TDE, *p,p'*-DDT, and PCB residues in the different species were in the respective ranges of 0.1-160 ppm; 0.1-450 ppm; 0.1-175 ppm; 0.1-200 ppm; 0.1-980 ppm; 0.1-420 ppm; 0.5-52 ppm. and 5-6,200 ppm. The residue levels were highest in *Lumbricus* sp.

See also **75-0249** **75-0330** **75-0347** **75-0395** **75-0431** **75-0448**

75-0317. Di Modugno, G.; Albano Annicchino, G.; Perrone, C.; Renna, P. (Ist. Patol. Aviare, Fac. Med. Vet., Univ. Studi Napoli, Naples, Italy). **Intossicazione acuta da esteri fosforici nelle galline ovaiole. [Acute poisoning by phosphate esters in laying hens.]** *Acta Med. Vet. (Naples) 19(1-2): 137-144; 1973.* (29 references) (Italian)

A case of increased morbidity and mortality among young laying hens due to ingestion of Baytex following application of the organophosphorous compound for fly and insect control is described. Depression, cyanosis of the comb, hypersalivation, paresis and paralysis of the legs and wings, and diarrhea were the main symptoms of poisoning. The hens laid eggs without hard shells. Hemorrhages, serous effusions, and lung edema were determined on autopsy. The blood cholinesterase activity was reduced by 36 to 81% compared to a control group. The Baytex residue in the organs averaged 39 γ/g. Endovenous administration of 10 mg contrathion (pralidoxime methylsulfate) per kg body weight resulted in total recovery.

75-0318. Guthrie, F. E. (North Carolina State Univ., Sch. Agr. Life Sci., Raleigh, NC). **Pending legislative restrictions on the use of agricultural chemicals on tobacco.** *Beitr. Tabakforsch. 7(3): 11-18; 1973.* (23 references)

Legislative restrictions on tobacco may restrict import of tobacco by assigning residue tolerances or restrict grower use of pesticides to protect an export market. The West German law is the most comprehensive one thus proposed, listing the following tolerance levels (ppm): azinphosmethyl 0.4; carbaryl 2.5; DDT components 0.1; diazinon 0.3; disyston (disulfoton) 0.4; dimethoate 0.6; dinocap 1.0; dithiocarbamate fungicides 3.0; endosulfan 0.5; lindane 2.0; malathion 3.0; parathion 0.5; phorate 0.01; phosphamidon 0.15; toxaphene 0.1. A listing of the practices in 35 countries and in agencies of the United Nations regarding existing or pending institution of tolerance laws is provided. Little change has occurred in actual residues of DDT on commercial American cigarettes and other tobacco products since the recent concern about residues began. Residues of endrin, though decreasing on cigarettes, are still well above the proposed tolerances on other types of tobacco. Surveys of unmanufactured American tobacco indicates that DDT levels are still far above the tolerances in the proposed West German law, as are dieldrin and toxaphene residues. Some recent experimental tobaccos have been examined for methomyl and azodrin with the concern that they might cause problems in air-cured types of tobacco when used heavily. Degradation in smoke, as in flue-cured tobaccos, reduces this problem. Two specific environmental problems have arisen recently. In Sweden, where use of DDT is banned, the major contributing factor to DDT in rivers near congested areas has been identified as the DDT content in cigarette butts. The second recent problem concerns the safety of workers handling tobacco treated with phosphates and carbamates.

75-0319. Rustam, H.; Hamdi, T. (Dept. Neurol., Med. City Teaching Hosp., Univ. Baghdad, Iraq). **Methyl mercury poisoning in Iraq: a neurological study.** *Brain 97(3): 499-510; 1974.* (32 references)

Fifty-three patients from different hospitals in Baghdad, Iraq were studied neurologically after poisoning by bread contaminated with methyl mercury. Multiple system involvement was found in the majority of these patients; in no case did it clinically resemble motor neuron disease. Cerebellar disturbance was the most common and disabling deficit. Sensory changes clinically resembling peripheral neuropathy were observed but not confirmed electrophysiologically. The severely poisoned patients had diffuse CNS lesions similar to encephalopathy, with evidence suggesting involvement of the hypothalamus. Six patients had optic atrophy, which was bilateral in three cases. No correlation was found between the severity of the poisoning and the mercury blood levels, individual variation in sensitivity to mercury appearing to be the decisive factor. The mildly and moderately affected patients recovered well with no specific treatment. Recovery was evident in cerebellar function, superficial sensations, and visual acuity. Taste and smell were intact in all patients.

75-0320. Shaw, E. B.; (Dept. Pediat., Univ. California, San Francisco, CA). **Endotracheal intubation and tracheostomy—clinical concepts.** *Dis. Mon. 3: 1-35; 1974.* (16 references)

Agricultural sprays can cause death by respiratory paralysis. Along with the administration of suitable antidotes, gastric lavage, and other standard procedures, one of the greatest necessities in meeting this emergency, whether self-induced or accidental, is prompt tracheostomy and the institution of positive-pressure respiration. It is noted that it is not necessary for anoxia to be complete for brain damage to occur. Partial deprivation of oxygen, if prolonged, can result in severe brain damage. Scrupulous and well-trained follow-up personnel must be provided if the patient is to recover. Hemorrhage, occlusion of the tracheostomy cannula, and pneumothorax are complications which may occur.

75-0321. Hattis, D. B. (Stanford Univ., Palo Alto, CA). **Proliferation of antigen binding cells and immunoglobulin bearing cells, and case studies in the use of scientific information in social decision-making: lead arsenate as an urban insecticide and sodium nitrate as a food additive.** *Diss. Abstr. Int. 35(3): 1305B-1306B; 1974.*

In a two-part study, the population kinetics of mouse splenic "B" cells were first examined using fluorescent staining and fluorescence-activated cell

sorting techniques combined with in vivo ^{3}H-thymidine labeling and autoradiography. Two case studies were described in which an attempt was made to integrate various types of information useful for social evaluation of a given technology and the performance of the regulatory agency. From the lead arsenate study it was concluded that the persistence of lead arsenate in the area of application, the human epidemiologic data on carcinogenesis by inorganic arsenicals, and the existence of apparently safe alternatives make use of this material in areas of high population density unwise. The decision-making process involved in evaluation of sodium nitrite was examined after access was gained to formerly confidential information from Food and Drug Administration files; the effects of secrecy are challenged. (Author abstract by permission, abridged. Copies of the thesis are available from University Microfilms, Order No. 74-20,198.)

75-0322. Pollinger, B.; Cozma, V.; Oprisan, C. (Iasi, Rumania). **Clinical and electromyographic study of two cases of severe polyneuritis following acute poisoning with Neguvon (organophosphoric pesticide).** *Electroencephalogr. Clin. Neurophysiol. 35(4): 433; 1973.*

Severe polyneuritis occurred in two cases of acute poisoning with Neguvon, an organophosphorus pesticide. The polyneuritic syndrome occurred 15 and 19 days after ingestion of the poison, when the disturbances of the acute stage had vanished. In one case the distal motor deficiency in all four limbs was accompanied by muscular atrophy and severe myalgia. In the second case, the motor deficiency was present in only the lower limbs. EMG examinations on the former patient after a 4 month interval confirmed the peripheral neurogenic character of the lesions and their severity, expressed by persistent denervation phenomena and the total absence of reinnervation potentials. Clinical examination 10 months after onset showed striking improvement while EMG tracings during contraction showed significant functional recovery. In the second case, EMG examination revealed the presence of a neurogenic syndrome with denervation potentials in the distal muscles.

75-0323. Roll, R. (Max-Von-Pettenkofer-Inst., Bundesgesundheitsamtes, Berlin, Germany). **Toxicological evaluation of special organochlorinated compounds.** *Environ. Qual. Safety 2: 117-124; 1973.* (27 references)

A summarizing account of the problems of polychlorinated biphenyls, of edematous disease in chickens, and of 2,4,5-T is given. To estimate toxicological risks with regard to polychlorinated biphenyls, it is important to gain knowledge of their distribution in the body, their metabolism, and the elimination and toxicity of the metabolites. Current knowledge of their metabolism is small, and the toxicity on different cell systems is practically unknown. A review is given of the events which resulted in restrictions placed on the chemical. It is noted, however, that despite evidence of its teratogenic effect, no hazard exists for pregnant women after ingestion of admissible 2,4,5-T residues in food. Considering the dose/effect relation and the teratogenic no-effect level which should be rated at about 20 mg/kg/day at present, a general ban on the use of herbicides containing 2,4,5-T is not recommended.

75-0324. Kenaga, E. E. (Agr. Dept., Dow Chem. Co., Midland, MI 48640). **Factors to be considered in the evaluation of the toxicity of pesticides to birds in their environment.** *Environ. Qual. Safety 2: 166-181; 1973.* (15 references)

The most useful toxicological unit for evaluating pesticide effects on birds is mg pesticide intake/kg body weight/day. Body weights can be estimated to within 20% by using literature values. The quantity of food eaten/day can be reasonably estimated. Based on a linear relation of body weight to food intake, daily food intake as percent of body weight can be estimated to within a 2-fold factor. The upper limits of pesticide residues on various species, shapes, and sizes of plant food and insects immediately after application can be reasonably estimated. Data concerning the amount of pesticide present after passage of time has been collected for many pesticides. A 1 pound/acre dosage of a noncumulative pesticide could result in a 35-fold difference (7-240 ppm) between maximum pesticide residues in different sized natural bird food particles. A 20 gram bird of nearly any species will likely eat 5 times as much food in mg/kg/day as a 1,000 gram bird. Thus, a 20 gram bird could eat 100 times more pesticide than a 1,000 gram bird in terms of mg/kg/day. Evaluation of the toxicity of pesticides in the food of birds is most realistic if the results of subacute or chronic dietary feeding studies are available.

75-0325. Farago, E.; Takats, G. (Inst. Forensic Chem., Budapest, Hungary). **Effects of diazepin derivatives on cholinesterase activity.** *Arch. Toxicol. 32: 241-243; 1974.* (8 references)

The effect of therapeutic doses of diazepin derivatives (5 mg/day for 5 days) on the whole blood cholinesterase activity of 60 hospital patients was studied. The cholinesterase activity of most patients had increased 22 to 25% over base values by day 6 after the beginning of treatment. In six patients, an increase of 12-18% was observed, while in two patients an increase of 36-42% was noted. For 7-8 days after the termination of diazepin treatment, there was practically no change in the cholinesterase level; the activity remained significantly elevated over baseline values. The activity level returned to base values only after 12-14 days. The fact that every diazepin derivative used significantly increased normal cholinesterase activity must be considered when testing persons working with pesticides and when making postmortem evaluations in cases of fatal intoxication.

75-0326. Ashbel', S. I.; Stroykova, G. D.; Khil', R. G.; Yavorovskaya, Yu. S. (Inst. Ind. Hyg. Occupational Diseases, Gorkiy, USSR). **O profilaktike professional'nogo merkurializma u rabochikh proizvodstva granozana novym sovetskim antidotom D-penitsillaminom. [Prevention of occupational mercurialism in workers engaged in production of granosan by using the Soviet-made antidote D-penicillamine.]** *Gig. Tr. Prof. Zabol. 18(7): 25-28; 1974.* (4 references) (Russian)

The efficiency of the prophylaxis of occupational mercurialism in workers exposed to diethyl mercury, ethylmercury chloride, mercury vapors, and mercuric chloride during granosan production by the use of the domestic drug D-penicillamine was studied. The workers were administered oral doses of 300 mg D-penicillamine together with 50 mg vitamin B6 daily before the start of the shift for one month. While urine samples collected before the start of the prophylaxis contained only inorganic mercury within normal limits, samples collected after D-penicillamine dosage was started contained high amounts of organic, and increased quantities of inorganic mercury. This indicates sharply increased passage of mercury in the urine by the use of D-penicillamine for prophylactic purposes. D-penicillamine is well tolerated and does not provoke side effects.

75-0327. Doroshchuk, V. P. (Inst. Hyg. Toxicol. Pesticides, Polymers, Plastic Materials, Kiev, USSR). **Sostoyaniye vneshnego dykhaniya pri porazhenii nervnoy sistemy vsledstviye voizdeystviy nekotorymi pestitsidami. [Status of respiratory function in pesticide-induced lesions of the nervous system.]** *Gig. Tr. Prof. Zabol. 18(7): 45-46; 1974.* (Russian)

The status of the respiratory function was studied by spirographic tests in patients with lesions of the nervous system due to acute or chronic exposure to pesticides. Cases of acute poisoning by polychloropinene and polychlorocamphene, and chronic poisonings by thiram, granosan, and combinations of pesticides were included in the experiment. The vital capacity of the lung was less than 85% of the normal value in on third of all patients. The changes in the spirographic parameters were determined by the neurological syndromes produced by the pesticides rather than by the pesticide proper. The changes in the respiratory function correlated well with the polyneuritis syndrome, indicating that the reduced vital capacity is due to paralysis of the respiratory muscles.

75-0328. Caresana, D. (Candia Lomellina, Pavia, Italy). **[Letter.]** *Inquinamento 16(6): 28-29; 1974.* (Italian)

Two cases of poisoning in animals by pesticides are reported. Poisoning by parathion was detected by chemical-toxicological tests in bees following death of almost all bees in an apiary. Parathion was applied on plants near the apiary one or two days before the deaths occurred. Frequent abortion in sows in a breeding farm was determined to be due to the ingestion of herbicide-treated plants during pregnancy.

75-0329. Yoshida, T.; Nakamura, H.; Kobayashi, N. (Agr. Chem. Inspect. Sta., Min. Agr. Forest., Kodaira, Tokyo, Japan). **[Recently registered new pesticides; a list of applications of new pesticides.]** *Kongetsu No Noyaku (Agr. Chem. Mon.) 18(11): 64-65; 1974.* (Japanese)

A list of application standards of recently registered (since 1968) insecticides was published by the Agricultural Chemicals Inspection Station, dealing with the range of application and safe use. These insecticides have been tested for toxicity to animals and for persistence in and on crops. The insecticide formulations tabulated herein are Phosvel EC (34%), Phosvel powder (2%), Phosvel-Kasugamycin powder (2% + 0.1%) and Phosvel-dichlorvos EC (30% + 20%). Phosvel (cleptophos) is a trade name of 4-bromo-2,5-dichlorophenyl methyl phenylphosphonothionate.

75-0330. Endo, T.; Kimura, Y.; Masuyama, E.; Yazaki, H.; Kusunoki, F. (Engaru Kosei Hospital, Hokkaido, Japan). **[A case of acute intoxication caused by swallowing fenthion by mistake.]** *Nippon Noson Igakkai Zasshi (J. Jap. Ass. Rural Med.) 23(2): 142; 1974.* (Japanese)

A farmer, age 71, was hospitalized 13 hr after swallowing about 10 ml of fenthion 50% EC by mistake while drunk. Symptoms included nausea, abdominal pain, and slight disturbance of consciousness. Sudorrhea, hyperlachrymation, disturbances of gait, conspicuous miosis (loss of light reflex), and wet rales in lower lungs were recognized; blood pressure was 140/70. Six ampoules of PAM (pralidoxime) and one ampoule of atropine sulfate every 1-2 hr were administered until the afternoon of the next day. After 5 p.m. on the third day the patient recovered consciousness and was able to eat; however, his condition deteriorated beginning early on the morning of the fourth day, and the patient lost consciousness and died at 3:40 p.m. The amounts of PAM and atropine sulfate administered were respectively 7.5 g and 30 mg. It was felt keenly that it was time to reconsider the use and storage of agricultural pesticides. It was also considered inadvisable to sell as toxic a pesticide as fenthion 50% EC labeled as a low toxicicity pesticide.

75-0331. Galston, A. W. (Dept. Biol., Yale Univ., New Haven, CT 06520). **The ungreening of South Vietnam.** *Natur. Hist. 83(6): 10,12,14; 1974.*

A one-to-one mixture of two common herbicides, 2,4-D and 2,4,5-T, was used as the main defoliant in Vietnam. Two other herbicides, picloram and cacodylic acid were used to a lesser extent. The mixture of 2,4-D and 2,4,5-T was applied at about 25 pounds/acre, with the total amount of herbicides sprayed over the 5-6

million acres reaching 100 million pounds. It is estimated that 36% of all the mangroves in South Vietnam have been killed by defoliating chemicals. The mangrove community is an extraordinarily rich and important ecological complex; many fish and shellfish complete a portion of their life cycle there. Its destruction alone is certain to affect not only the ecosystem but the nutrition of the human population. Damage to extensive inland forests is not as yet determined. Repeated spraying of communities which lay in the path of defoliation operations resulted in loss of crops and the necessary movement of the population to urban relocation centers. Psychological reactions were also noted; persons who had been repeatedly exposed to sprays showed a higher level of emotional strain than other groups. On the possibility of direct damage to humans from herbicides, it is now known that most samples of 2,4,5-T are contaminated with one to 25 ppm TCDD. As little as 10 ppb of TCDD may cause malformations of developing embryos in utero. Persistence of TCDD is very high. Thus unintentional but widespread poisoning of the populations of South Vietnam may have taken place and may be continuing.

75-0332. Malmberg, T. (Dept. Animal Ecol., Univ. Lund, S-223 55 Lund, Sweden). **Pesticides and the rook *Corvus frugilegus* in Scania, Sweden between 1955 and 1970.** *Oikos 24(3): 377-387; 1973.* (95 references)

Rook populations are usually very stable. Only a few cases of large fluctuations are known. In Scania, Sweden, breeding numbers of the species, based on nest counts, decreased from about 11,100 nests in 1955 to 5,100 in 1967 and increased to 6,700 in 1968 and 8,300 in 1969. Chlorinated hydrocarbon analysis of 26 rook specimens from 1965-1970 showed mostly low levels of lindane, dieldrin, PCB, and DDT and its metabolites. Analyses of total mercury were made on 75 rook specimens from 1887-1971 and showed high or very high levels in the period 1950-1966 and moderate or low before and after these years. This period corresponds to the time when alkylmercury seed dressings were commonly used in Sweden. These chemicals have been banned. The high mortality and pronounced population reduction in Scania were not paralleled in Danish rooks, which were not exposed to the same pesticides. It is suggested that the temporary decrease of the Swedish rook population was caused by alkyl mercury, perhaps working in combination with aldrin poisoning.

75-0333. Anttila, R. (Water Conservation Lab., Helsinki City Engineer's Office, Helsinki, Finland). **Effect of sewage on the fish fauna in the Helsinki area.** *Oikos 15(Suppl.): 226-229; 1973.* (15 references)

The City of Helsinki, Finland, began a study of the effects of sewage on the fish fauna and fishing in the Helsinki sea area in 1969. The main research methods are test fishing with a series of nets and fishery enquiries. Sewage has considerably changed the quality and quantity of fish in the Helsinki area. The fish species susceptible to pollution (brown trout, whitefish, turbot, and ide) have declined and/or moved to cleaner areas. Of the major edible fish, pike-perch has withstood the pollution best. The fish, taken from a sea area of 3,000-4,000 hectares, also have flavor defects. The residual substance contents in the fish taken from the Helsinki area have been relatively low, the methyl mercury content in perch being about 0.4 mg/kg and the corresponding pesticide content being about 0.03 mg/kg of the fish fresh weight.

75-0334. Sandifer, S. H. (Dept. Med., Med. Univ. South Carolina, Charleston, SC 29401). **Industrial and agricultural chemicals.** *Pediatrics Supplement part II 53(5): 843-844; 1974.* (5 references)

Two important classes of pollutants generated by agriculture are nitrates and pesticides. No significant health effects of pesticides on workers have been demonstrated in 13 community studies funded by EPA. DDT levels in the sera of blacks are about 2 to 3 times those in whites, and laboratory data shows a significant correlation between total DDT and G-6-PD deficiency. The DDT levels in cord blood from human neonates ranged between 6 and 78 ppb in blacks and between 3 and 76 ppb in whites in a recent study; the mean total DDT was higher in blacks than in whites. The administration of phenobarbital and diphenylhydantoin to children lowers the levels of DDT in the serum. Data from a Mississippi study suggests some association between high pesticide usage and high infant mortality. A South Carolina study showed no significant relationship between infant mortality and birth weight and the dollar value of pesticide used per acre. Animal studies have shown fetal wastage on exposure to large pesticide concentrations. Physicians should be alert for cases of organophosphate poisoning and be familiar with the symptoms and treatment.

75-0335. Il'ina, V. I.; Blekherman, N. A. (All-Union Sci. Res. Inst. Hyg. Toxicol. Pesticides, Polymers and Plastic Materials, Kiev, USSR). **Deyaki dani pro stan spetsifichnikh funktsiy zhinochogo organizmu v osib, yaki pratsyuyut' z geksakhlortsiklogeksanom. [Data on the status of the specific female functions of the organism in female workers exposed to hexachlorocyclohexane.]** *Pediat. Akush. Ginekol. 36(1): 46-49; 1974.* (Ukrainian)

The status of the sexual functions was studied in female workers occupationally exposed to hexachlorocyclohexane (BHC), benzene, and chlorine for 2 to over 11 years. Ovarian-menstrual disturbances (hypermenorrhea, oligomenorrhea, and hypomenorrhea), secondary infertility, and endocervicitis, as well as lesions of the hepatobiliary system were observed in women exposed to technical-grade hexachlorocyclohexane, gaseous chlorine, and benzene. Distur-

bances in the menstrual cycle, erosion of the cervix uteri, primary infertility, prolapse of the vagina, hypomenorrhea, and oligomenorrhea were diagnosed in workers exposed to technical-grade hexachlorocyclohexane alone. The karyopycnotic index was higher on the 7th and 21st days and lower on the 14th day of the menstrual cycle of these women than in a control group. The pregnanediole excretion was above normal in the ovulatory and luteal phases. The estrogen excretion was significantly increased in all phases of the estrous cycle. Hexachlorane (BHC) and its metabolites were detected in vaginal smears.

75-0336. Anonymous. **Public health pesticides.** *Pest Contr. 42(6): 30-31; 1974.*

Changes in pesticide handling have been necessitated through enactment of the Federal Environmental Pesticide Control Act of 1972. This act specifies that a pesticide must be designated for general use or for restricted use based on the potential hazard to the environment or to the applicator. Restricted use pesticides are more difficult to obtain and as of October 21, 1976, may only be applied by a certified applicator. EPA-registered pesticides in current use are listed along with the arthropod against which the compound is effective. Specific information regarding the type of formulation, method of application, or particular stage of the insect life cycle in which the pesticide should be applied is not given. The need to follow requirements and restrictions provided on the labeling of approved compounds is stressed.

75-0337. Bouron, H. (Author address not given). **Teneurs en residus de pesticides dans et sur les fruits et legumes. [Contents of pesticide residues in and on fruits and vegetables.]** *Phytoma 253: 28-29; 1973.* (French)

An interdepartmental regulation imposed July 5, 1973, concerning the maximum allowable pesticide residue levels in and on fruits and vegetables in France is reported. The regulation concerns domestic and imported produce equally, and is in agreement with a related regulation issued by the European Economic Community. Certain pesticides are prohibited in France and, consequently, must not be present as residues in either domestic or imported produce. Other pesticides, released for use, have zero tolerances in produce, which can be achieved by adequate application. The required waiting times from pesticide application till harvesting are specified. Certain pesticides, such as demeton, are released for use for fruits but not for vegetables.

75-0338. Siriez, H. (Author address not given). **Oiseaux d'Europe: les pesticides, la chasse et la fluctuation des especes. [European birds: pesticides, hunting, and fluctuation of species.]** *Phytoma 253: 35-37; 1973.* (French)

Relationships between the use of pesticides and other factors and the fluctuations in the taxonomic composition of the avian fauna of Europe are discussed in connection with the recent publication of a book on the history of European birds. While organochlorine pesticides, such as DDT, aldrin, and dieldrin, have been found repeatedly to be hazardous to the avian fauna and blamed for the disappearance of certain species in certain areas, fluctuations in the taxonomic composition of the European avian fauna are also influenced by general human activity, including agriculture, horticulture, urbanization, and especially hunting. Thus, pesticides are not solely responsible for the disappearance of certain bird species.

75-0339. Grabensee, B. (I. Medizinische Klinik A, Universitaet Duesseldorf, Duesseldorf, Germany). **Klinik der Paraquatvergiftung. [Clinical treatment of paraquat poisoning.]** *Pneumonologie 150: 173-179; 1974.* (31 references) (German)

The clinical picture and treatment of acute poisoning by paraquat are described on the basis of 5 cases of suicidal poisoning of which three were lethal. A typical clinical picture developed after oral intake of as little as 20 ml gramoxone (20% paraquat). Following a period with few symptoms, homogeneous, fibrinous necrotic changes in the mucosa of the upper gastrointestinal tract, reversible liver and kidney damage, capillary hemorrhages, and lung edema and fibrosis usually begin to appear two to four days after poisoning. While minimal lung changes tend to be reversible, the pulmonary edema and fibrosis can often be fatal; they reach a maximum about one week after poisoning. Therapy includes gastric lavage with an adsorbent such as aluminum silicate or bentonite, high colonic enemas, and forced osmotic diuresis. Hemodialysis is of clinical value only if acute renal failure is present. Since oxygen is assumed to play a role in the pathogenesis of the lung lesions involving hydrogen peroxide formation, oxygen therapy must be restricted to cases of serious hypoxemia. Steriods and cyclophosphamide seem to be beneficial. The resorbed and not yet eliminated quantity, i.e., the concentration of paraquat in the organs, essentially influences the outcome of the poisoning.

75-0340. Poche, R. (Pathologisches Institut, Staedtische Krankenanstalten Bielefeld, Bielefeld, Germany). **Die Pathogenese der Paraquat-Lunge. [Pathogenesis of paraquat lung.]** *Pneumonologie 150: 181-184; 1974.* (2 references) (German)

The early changes of the lungs in paraquat poisoning were studied in a 53-year-old male patient who died 52 hours after ingesting 2 g of paraquat. The alveolar walls were found to undergo gradual destruction. At first, the alveolar epithelium cells became edematous and vacuolated, and intraalveolar edema appeared. The

edema fluid was low in protein. Then the alveolar epithelium cells desquamated, and the edema fluid became protein-rich. Hyaline membranes were also observed. The endothelial cells of the blood capillaries developed a cellular edema which occluded the lumens of the capillaries. Other capillaries lost their endothelial cells. The tube of the basal membrane in many cases was dilated and formed capillary aneurysms. The capillaries ruptured, leading to widespread hemorrhages. The basal membrane and the supporting tissue of the alveolar wall disintegrated. Finally, there was complete destruction of the alveolar unit. The terminal bronchioli and the arterioles and venules and their adventitial tissues – the starting point of reparative changes that replace the destroyed parenchyma and ultimately lead to fibrosis, cirrhosis, or adenomatosis of the lungs–remained unaffected. The reason for this selective action of paraquat on the alveolar wall is founded in its special chemical property, namely the formation of unstable hydroperoxides in the presence of reducing substances. These hydroperoxides yield aggressive activated oxygen which causes nonbiological oxidation with promiscuous destruction of organic substances. The special biological and physiological environment of the alveolar unit of the lung offers optimum conditions by producing hydroperoxides continuously. Since the activity of paraquat is dependent on the oxygen partial pressure, early treatment of paraquat poisoning with oxygen inhalation is strongly contraindicated.

75-0341. Borchard, F. (Pathologisches Institut, Universitaet Duesseldorf, Duesseldorf, Germany). **Ultrastrukturelle und lichtmikroskopische Befunde bei drei protrahiert toedlich verlaufenden Paraquatvergiftungen. [Ultrastructural and light-microscopic findings in 3 cases of paraquat poisoning with prolonged lethal course.]** *Pneumonologie 150: 185-189; 1974.* (1 reference) (German)

Morphological alterations in the lungs of 3 cases of poisoning which ended in death respectively on the 10th, 11th, and 25th days are reported. Combined light and electron microscopic studies revealed that 10 and 11 days after ingestion of paraquat the endothelium of the occasionally congested capillaries was intact. The basal membranes rarely showed alterations. Red blood cells, some round cells, strands of fibrin, and lamellar cell debris were seen in the copious alveolar edema. There were also varying numbers of leukocytes and alveolar macrophages with many phagolysosomes and cytosegresomes. Fibroblasts with lipid droplets between the extensive endoplasmatic reticulum formed varying amounts of collagen fibrils in the alveolar spaces and sometimes in the highly edematous interstitial space. Sometimes surrounded by collagenous material, they were thus devoured by macrophages. Twenty-five days after paraquat intake, severe alveolar fibrosis, focal interstitial fibrosis, and areas of atelectasis were found.

75-0342. Szarmach, H.; Poniecka, H. (Dermatol. Clinic, Med. Acad., Bialystok, Poland). **Alergia kontaktowa w rolnictwie. [Contact allergy in agriculture.]** *Przegl. Dermatol. 60(4): 479-484; 1973.* (16 references) (Polish)

Skin tests were performed on 200 patients from rural areas, mostly farm workers, who were treated for allergic skin rashes and allergic-toxic dermatitis. The lesions were almost always related to occupational exposure to different allergens found in chemical preparations used in modern agriculture. Positive tests were obtained most frequently with chromium (28), tetramethylthiuram disulfide (20), turpentine (12), cobalt (18), formalin (10), tobacco (in 3 out of 7 tobacco workers), and less frequently with nickel, copper, and zinc (6, 8, and 10 respectively). Sensitivity to motor oils and lubricants, Azotox, DDT, BHC, methoxychlor, and pyrethrins was detected in only 1 or 2 of 50 individuals tested in each case. This could be explained by the low sensitizing capacity of insecticides from the chlorinated hydrocarbon group.

75-0343. Cavanagh, J. B.; Fuller, N. H.; Johnson, H. R. M.; Rudge, P. Inst. Neurol., Queen Square, London, England). **The effects of thallium salts, with particular reference to the nervous system changes.** *Quart. J. Med. 43(170): 293-319; 1974.* (81 references)

Three cases of proven thallium poisoning are presented, occurring in 25, 56, and 60 year-old males. Thallium is cumulative in the tissues and is slowly released; thus repeated small doses over a short period of time will have cumulative toxic effects. In each of these cases the neurological symptoms were preceded by transient episodes of vomiting and/or diarrhea. Subsequently, painful paresthesia of the fingers and toes developed, followed by weakness of the limbs. In the 25 yr old male, symptoms did not advance beyond this point. In the 56 yr old male symptoms worsened and death occurred 19 days after the onset of sensory symptoms. In the other case, death ensued in only 8 days. In these fatal cases, all four limbs were affected, as well as the cranial nerves and the respiratory muscles. Loss of hair occurred only in the victim who survived. The more rapidly fatal case showed little evidence of neuronal degeneration in the sciatic nerve and spinal cord. The less rapidly fatal case showed marked and extensive distal degeneration of nerve fibers in all nerves examined, and early degenerative changes in nerve fibers in oculomotor muscles. Chromatolysis of affected motor nerve cells was prominent, but no other neuronal changes were visible in the rest of the central nervous system. The distal 'dying back' type pattern in sensory and motor nerves was consistent with the clinical symptomatology in all three cases. Thallium was detected in the cremated remains of one victim, in the post-mortem tissues of the second victim, and in the urine of the survivor seven weeks after poisoning.

75-0344. Murray, C. P. F. V.; Sauceda, F. M.; Narvaez, G. M. (Author address not given). **La contamination ambiental y la salud del nino. [Environmental contamination and the health of children.]** *Salud Pub. Mexico 15(1): 91-100; 1973.* (Spanish)

Statistical data on infantile morbidity and mortality and the corresponding causative agents in Mexico are presented. The death toll due to incidental poisoning by pesticides and fertilizers in the general population amounted to 42 in 1969, to 45 in 1970, and to 22 in 1971, accounting for 12.4% of all accidental deaths. Such poisonings in the population below 15 years of age amounted to 15 cases in 1969, 16 cases in 1970, and 11 cases in 1971, corresponding to an incidence of 13%. In the case of lethal anemia in children below 13 years of age, prolonged contact with DDT was determined to be the cause of death in 5 cases or 20% of all cases. Aside from DDT, the solvent benzene and pesticides such as parathion, chlordane, and pentachlorophenol were found to cause aplastic anemia. Granulocytopenia following exposure to DDT spray for one week was diagnosed in workers. The findings indicate the myelotoxic effect of DDT.

75-0345. Pavlou, S. P.; Clayton, J. R., Jr. (Dept. Oceanography, Univ. Washington, Seattle, WA). **Pollution in coastal waters.** *Science 184(4139): 914-915; 1974.* (3 references)

Between 1955 and 1959, it is estimated that the ratio of inshore to offshore zooplankton biomass fluctuated roughly between 4.0 and 0.1. These variations occurred both yearly and seasonally in California coastal waters. If it is assumed that a similar variation in the ratio occurred throughout the period 1959 to 1969, the reported hot spots of DDT and DDT derivatives are damped out, resulting in a nearly uniform inshore-offshore distribution. However, if a lower bound ratio value is used, an even larger inshore to offshore gradient is established. Therefore, any conclusive statements based on these data should contain values that have been normalized to the zooplankton biomass ratio measured in 1969. Concentration data should always be normalized to biomass-related parameters so that meaningful interpretations of various toxic pollutants in the marine environment as they affect the standing crop and growth dynamics of the biological system in question can be made.

See also **75-0249** **75-0257** **75-0264** **75-0278**

75-0346. Arhem, P.; Frankenhaeuser, B. (Nobel Inst. Neurophysiol., Karolinska Inst., Stockholm, Sweden). **DDT and related substances: effects on permeability properties of myelinated *Xenopus* nerve fibre. Potential clamp analysis.** *Acta Physiol. Scand. 91(4):502-511; 1974.* (23 references)

The *in vitro* effects of DDT and related substances on the membrane currents associated with step changes in the membrane potential were studied using myelinated fibers from the sciatic nerve of *Xenopus laevis*. The substances tested in addition to DDT, DDE, DDD, DDMU, DDA, DDGN, bis-(*p*-chlorophenyl)-acetamide, and PCBs. DDT, DDA, and bis-(*p*-chlorophenyl)-acetamide had acute effects on the permeability parameters of the nerve membrane. DDT affected the turn off process of the sodium permeability mechanism after a positive potential step; the effect was large on fibers from *Rana pipiens* but negligible on *Xenopus* fibers. DDA affected the turnoff process of the potassium permeability mechanism, while bis-(*p*-chlorophenyl)-acetamide affected the sodium and potassium permeability constants, *P*Na and *P*K. The other substances tested had no or only marginal acute effects. The main effect of DDA was a specific effect on the rate constant βn. Thus, the different effects of the experimental substances were related to defined minute molecular differences between them.

75-0347. Krumzdorov, A. M. (Kuban Agr. Inst., Krasnodar, USSR). **Prevrashcheniye 2-metoksi-3,6-dikhlorbenzoynoy kisloty (dikamby) v rasteniyakh kukuruzy. [Metabolism of 2-methoxy-3,6-dichlorobenzoic acid (dicamba) in corn plants.]** *Agrokhimiya 10(7): 128-133; 1974.* (22 references) (Russian)

The metabolism of dicamba in corn plants was studied by thin-layer chromatographic analysis. Corn was sown 11 months or 6 days after dicamba was applied to the soil. The degradation of dicamba was found to start during the very first days after penetration into the leaves. Complete degradation occurred within 12 months, depending on the dose applied. The metabolites of dicamba were identified as 3,6-dichlorosalicylic acid, *para*-aminobenzoic acid, and benzoic acid. These metabolites are more persistent than dicamba, and were detected for as much as 2 to 3 years after the application of the herbicide.

75-0348. Suschetet, M.; Leclerc, J.; Lhuissier, M.; Loisel, W. (Sect. Rech. Qual. Aliment. Homme, Inst. Nat. Rech. Agron., Dijon, France). **Toxicite et effets nutritionnels chez le rat, de deux herbicides: Le piclorame (acide amino-4 trichloro-3,5,6 picolinique) et l'atrazine (chloro-2 ethylamino-4 isopropylamino-6-*s*-triazine). [Toxicity and nutritional effects in the rat of two herbicides, picloram and atrazine.]** *Ann. Nutr. Aliment. 28(1): 29-47; 1974.* (10 references) (French)

The toxicity and nutritional effects of picloram and atrazine were studied in young male and female Sprague-Dawley rats in a 6 month-experiment. The animals were kept on diets containing 0.01 or 0.1% picloram or 0.01 or 0.05% atrazine. Picloram in the lowest concentration of 0.01% caused only slight leukopenia. At the high dose, it caused several deaths, reduced the food utilization coefficient in females, and provoked slight hypertrophy of the liver in both sexes. Atrazine fed in doses of 0.01 and 0.05% caused growth retardation, partly due to the reduction of food intake by the animals. Disturbances in the thiamine and riboflavin metabolism, slight leukopenia, and alterations of the relative organ weights were also observed. Histological investigations revealed no lesions associated with the herbicides in question.

75-0349. Grolleau, G.; Lavaur, E. de; Siou, G. (Lab. Petits Vertebr., Cent. Nat. Rech. Zootech., Inst. Nat. de Rech. Agron., Jouy en Josas, France). **Effects du 2,4-D sur la reproduction des cailles et des perdrix, apres application du produit par pulverisation sur les oeufs. [Effects of 2,4-D on the reproduction of quail and partridge after application of the product by spraying on eggs.]** *Ann. Zool. - Ecol. Anim. 6(2): 313-331; 1974.* (34 references) (French)

The effect of the dimethylamine salt of 2,4-D on the reproduction of quail (*Coturnix coturnix japonica* L.), grey partridge (*Perdrix perdrix* L.), and red partridge (*Alectoris rufa* L.) was studied by spraying the eggs with the powdered product. The 2,4-D was applied in a dose corresponding to that used for the treatment of cereals (1.2 kg/ha), as well as in increased doses of 2.4 and 6 kg/ha. Judging by the rate of hatching, the embryonal and postnatal mortality, and examination for teratogenic malformations in the young at the time of hatching and in unhatched embryos, 2,4-D had no harmful effects on the reproduction. The findings were similar for partridge, although there was a slight decrease in the viability of the young of grey partridge hatched from eggs treated at a rate of 6 kg/ha. Residue analyses performed on eggs of grey partridge revealed low residue levels of 2,4-D in the embryos and the rest of the eggs. The absence of remarkable toxic effects of 2,4-D is certainly due to the low rate of penetration of 2,4-D through the eggshell.

75-0350. Sinclair, P. R.; Granick, S. (Rockefeller Univ., New York, NY 10021). **Uroporphyrin formation induced by chlorinated hydrocarbons (lindane, polychlorinated biphenyls, tetrachlorodibenzo-*p*-dioxin). Requirements for endogenous iron, protein synthesis and drug-metabolizing activity.** *Biochem. Biophys. Res. Commun. 61(1): 124-133; 1974.* (21 references)

The chlorinated hydrocarbons lindane (γ-BHC), polychlorinated biphenyls, and 2,3,7,8-tetrachlorodibenzo-*p*-dioxin induce chick embryo liver cells in culture to rapidly accumulate uroporphyrin III. This is

in marked contrast to the delayed effect in animals. The induction is dependent on protein synthesis (cycloheximide inhibited), endogenous iron (chelators inhibited), and perhaps cytochrome P-450 (SKF 525A inhibited). Evidence was obtained for an unstable intermediate that is generated in the liver from chlorinated hydrocarbons and inhibits uroporphyrinogen decarboxylase, thus causing uroporphyrin to accumulate. The data suggests that the intermediate may be a hydroxylated derivative of the chlorinated hydrocarbon. (Author abstract by permission)

75-0351. Crone, H. D. (Australian Defence Sci. Serv., Defence Standards Labs., Victoria, Australia). **Can allosteric effectors of acetylcholinesterase control the rate of aging of the phosphonylated enzyme?** *Biochem. Pharmacol. 23(2): 460-463; 1974.* (11 references)

The effects of some quaternary nitrogen compounds on the rate of aging of sarin-inhibited acetylcholinesterase (AChE) were studied. Aging is the process whereby the reactivation of organophosphorus-inhibited AChE by pyridinium aldoximes diminishes with time. All of the aging experiments exhibited first order kinetics over the period of observation. Increasing the ionic strength slowed the aging process in bovine erythrocyte AChE. At low ionic strength, gallamine triethiodide, tubocurarine, and alcuronium reduced the rate of aging; alcuronium was most effective. At higher ionic strength, none of these compounds altered the rate of aging. However, when the enzyme was present in the cell membrane in its normal position, it was still influenced by tubocurarine and alcuronium, but not by gallamine. 3-Chloro-4-methyl-7-hydroxycoumarin had no effect on aging nor did atropine or its quaternary derivative *N*-methylatropinium nitrate. Aging was inhibited by a high concentration of *N*-methylpyridinium iodide. Thus, curariform drugs bind to AChE at low ionic strength, causing a reduction in aging (i.e., a reduction in the rate of loss of the isopropyl group from the phosphonylated enzyme). The disappearance of the effect at high ionic strength is presumably due to a decrease in the affinity of the compound for the enzyme.

75-0352. Palecek, F.; Vizek, M.; Chvalova, M.; Wachlova, M.; Holusa, R. (Fac. Pediatr., Charles Univ., Prague, Czechoslovakia). **Regulation of breathing in disease.** *Bull. Physio.-Pathol. Respir. 9(5): 1247; 1973.*

Several model diseases of the respiratory system have been induced in rats, including emphysema, silicosis, edema, and non-bacterial inflammation. The severity of the disease was evaluated via the levels of arterial blood gases. The role of the lung reflexes in the development of respiratory insufficiency was studied. Lung damage was induced in Wistar rats by intratracheal injection of a 0.7% suspension of carrageenan, or a 0.02% solution of paraquat, 0.5 ml per animal. After carrageenan the inflammatory changes were histologically dominant after two days. After paraquat, in two days there was marked lung congestion; if left for further development, the lung lesions changed into disperse lung fibrosis in 2-3 weeks. The acute stages of both diseases were characterized by hypoxia, tachypnea, and increased functional residual lung capacity. Tachypnea and hyperinflation were abolished by bilateral cervical vagotomy. The relation between tidal volume and breathing rate was changed by the disease in rats with vagi conducting or sectioned.

75-0353. Greene, W. B.; Walker, E. M.; Hennigar, G. R.; Gadsden, R. H.; Gale, G. R. (Med. Univ. South Carolina, Charleston, SC). **The synergistic effect of polychlorinated biphenyl (PCB) [and] dichlorodiphenyl-trichloroethane (DDT) compounds on mouse liver cells.** *Bull. S.C. Acad. Sci. 34: 65; 1972.*

Male and female adult white mice were fed diets containing 100 ppm PCB or DDT and combinations of PCB + DDT (50 ppm of each) for periods of 2 to 6 months in an effort to compare the effects of these dietary regimes on liver ultra-structure. Livers from animals fed DDT exhibited the expected changes, i.e., smooth endoplasmic reticulum proliferation, cytoplasmic inclusions, and a slight increase in fat deposition. Liver cells from animals fed PCB were comparable in many respects to those from DDT-PCB or DDT-fed animals. Marked differences were found in animals fed PCB-1242 (which contains an average of 42% chlorine by weight). Liver cells from these animals showed heavy concentrations of smooth endoplasmic reticulum vesicles containing micro-fat droplets. Other cells showed centrally located rough endoplasmic reticulum and marginated proliferating smooth and endoplasmic reticulum containing clumps of a clear to slightly dense material tentatively identified as altered glycogen.

75-0354. Sutou, S.; Tokuyama, F. (Nomura Res. Inst., Kajiwara, Kamakura, Kanagawa, Japan). **Induction of endoreduplication in cultured mammalian cells by some chemical mutagens.** *Cancer Res. 34(10): 2615-2623; 1974.* (29 references)

Chinese hamster cells treated with 4-nitroquinoline, captan, acridine dyes, and Cytoxan developed diplochromosomes, indicating the induction of endoreduplication. Thus these mutagens not only cause damage to genes but also cause changes in ploidy. There was no direct relationship between the induction of endoreduplication and mutagenic activity. Further analyses were conducted using 4-nitroquinoline 1-oxide. Endoreduplication after the first S phase (S_1) was mainly induced in the G_2 phase and then the S_2 phase. The S_2 phase took a particularly long time, comparable to the two S periods of an ordinary cell cycle. Since mutagenesis is closely related to carcinogenesis, agents which are mutagenic and also cause endoreduplication may be especially hazardous.

75-0355. Grant, W. F. (Genetics Lab., Macdonald Campus, McGill Univ., Quebec, Canada). **Mutagenic effects of environmental chemicals.** *Can. J. Genet. Cytol. 15(3): 658; 1973.*

Cytological effects of the insecticide Cygon 4E (dimethoate) have been investigated. In the *Allium* test at concentrations of 200, 400, 600 and 800 ppm, chromosome aberrations (chromosome fragments, anaphase bridges) were observed in 29.3, 36.9, 35.3, and 25.6% of the cells, respectively. Ethylmethanesulfonate (EMS), used as a positive control, gave 51.9, 44.9, and 56.3% chromosome aberrations for the 200, 400 and 600 ppm treatments, respectively. The mean percentage of chromosome aberrations for Cygon was 31.8 and for EMS, 49.6. These results would indicate that Cygon may be classified with those pesticides having only a moderate clastogenic ability.

75-0356. Cullimore, D. R.; Kohout, M. (Dept. Biol., Univ. of Saskatchewan, Regina, Sask., Canada). **Isolation of a bacterial degrader of the herbicide bromoxynil from a Saskatchewan soil.** *Can. J. Microbiol. 20: 1449-1452; 1974.* (5 references)

The microbiological degradation of the herbicide bromoxynil was studied under both in vivo and in vitro conditions. A method of enumerating the number of degraders in soil demonstrated a content of at least 10^4 degrader cells per gram soil at field capacity. An unidentified bacterial degrader was isolated from the soil and shown to be capable of degrading bromoxynil in vitro and in vivo. An algal bioassay system was used to monitor the degradation of bromoxynil in the in vivo experiments. (Author abstract by permission)

75-0357. Hutson, D. H.; Hoadley, E. C. (Shell Res. Ltd., Tunstall Lab., Sittingbourne Res. Cent., Sittingbourne, Kent, England). **The oxidation of a cyclic alcohol (12-hydroxyendrin) to a ketone (12-keto-endrin) by microsomal mono-oxygenation.** *Chemosphere 3(5): 205-210; 1974.* (5 references)

Carworth Farm E rats and New Zealand White rabbits were maintained on diets containing 4 or 10 ppm endrin. Both the rat and rabbit liver 10,000 *g* supernatants (microsomes plus cytosol) contained an agent which catalyzed rapid oxidation of *syn*-12-hydroxyendrin to 12-keto-endrin. Reaction rates with rat microsomes were linear up to 5 minutes, while those with rabbit microsomes were linear up to 30 minutes. The reaction rates with rabbit liver microsomes were linear up to protein concentrations of 4.5 mg/ml, but fell off markedly at 7 mg/ml. The activity was located in the microsomal fraction and was dependent on NADPH and oxygen gas. The pH optimum was between 7.4 and 7.8. The rate of product formation was 14-fold greater with male rat microsomes than with female rat microsomes; there were no differences between male rat and male rabbit microsomes. The enzyme was increased 4-fold in male rats on pretreatment with 10 ppm endrin for 2 weeks. The enzyme activity in the rat microsomes was inhibited in vitro by metyrapone. Endrin in relatively high concentrations also inhibited the reaction, while dieldrin had no significant effect. The rates of oxidation of *syn*-12-hydroxyendrin, *anti*-12-hydroxyendrin, and endrin at substrate concentrations of 0.125 m*M* were 0.56, $<$ 0.004, and 0.025 nmoles/min/mg protein, respectively.

75-0358. Froc, J.; Hascoet, M. (Author address not given). **Etude experimentale de la contamination du lait par les pesticides organochlores presents dans la nourriture des petits ruminants (brebis, chevres). [Contamination of milk by organochlorine pesticides present in the food of small ruminants (sheep and goat.)]** *C. R. Seances Acad. Agr. Fr. 59(10): 817-824; 1973.* (French)

The residue dynamics of the organochlorine pesticides lindane, α-BHC, β-BHC, hexachlorobenzene (HCB), heptachlor epoxide, and dieldrin were studied in milk from ewes kept on pesticide-contaminated diet for 49 days. The excretion of the pesticides in milk stabilized in the first 15 to 20 days, regardless of the pesticide concentration in the fodder. The rates of passage from fodder to milk fat were 6.5% for hexachlorobenzene, 4.3% for α-BHC, 1.5% for lindane-BHC, 13.3% for β-BHC, 15% for heptachlor epoxide, and 10% for dieldrin. After cessation of administration of pesticide-contaminated fodder, the contamination of milk decreased progressively but rather slowly. Two months after cessation of administration, the hexachlorobenzene, β-BHC, and heptachlor epoxide residues dropped to about 50%, the α-BHC and lindane residues to about 25%, and the dieldrin residues to about 30% of the respective initial levels.

75-0359. Puech, A. A. (Univ. of California, Davis, CA). **Translocation and metabolism of 2-chloroethylphosphonic acid (ethephon), and its influence on pigments during the ripening of fig, *Ficus carica* L., fruits.** *Diss. Abstr. Int. 35(4): 1477B-1478B; 1974.*

A study was performed to identify the pigments formed in figs ripened after application of ethephon and to assess the translocation and metabolism of the chemical in the fruit. A source-to-sink movement of ^{14}C was indicated by the ability of fruit sinks located distal to a treated leaf to mobilize radioactivity. A metabolism study of ^{14}C-ethephon in the Calimyrna fig variety revealed that between 40.2% and 62.4% of the radioactivity applied was converted to ^{14}C-ethylene during the first four days after treatment. A small amount, 0.02% to 1.15%, of the ^{14}C applied was recovered as $^{14}CO_2$. Though ^{14}C-ethephon was translocated into ripening fruits, only 0.2% of the radioactivity applied remained in treated fruits at the time of harvest. From 22% to 26% of this had been converted to a radioactive compound distinct from ^{14}C-ethephon. A comparison

with ^{14}C-ethylene established that it was not the source of modified ^{14}C found in ^{14}C-ethephon treated fruits. It appeared that ^{14}C-ethephon modification was not a result of active metabolic processes. Attempts to isolate and characterize the radioactive product was unsuccessful due to its disintegration during chromatographic purification. Also, it was not possible to synthesize a comparable substance by complexing ^{14}C-ethephon with various carbohydrates. (Author abstract by permission, abridged. Copies of the thesis are available from University Microfilms, Order No. 74-21,623.)

75-0360. Tsai, W. F. (Univ. of California, Davis, CA). **Metabolism of propanil: solubilization and purification of a propanil hydrolyzing aryl acylamidase from rice leaves.** *Diss. Abstr. Int. 35(4): 1478B; 1974.*

An aryl acylamidase (aryl-acylamine amidohydrolase, EC 3.5.1.a) from rice leaves, which catalyzes the hydrolysis of propanil (3,4-dichloropropionanilide), has been successfully solubilized and purified. The procedure involved preparing the enzyme-rich particles from crude homogenate, solubilizing the particles with 0.1% Triton X-100, and further purifying the enzyme by preparative gel electrophoresis. Purified rice leaf aryl acylamidase was very stable at 0°C, had a broad pH optimum between 8.0 to 8.5, and had a *K*m of 4.9 X 10^{-4} *M* for propanil. The enzyme was inhibited by heavy metal ions, *p*-chloromercuribenzoate, Tween 20, and some insecticides such as *O,O*-dimethyl-*O*-(4-nitrophenyl) phosphorothioate (parathion) and 1-naphthyl *N*-methylcarbamate (carbaryl). However, enzyme activity was significantly increased in the presence of a low concentration (0.5-1.0%, v/v) of methanol, ethanol and acetone. The enzyme also catalyzed the hydrolysis of 3,4-dichlorolactanilide but with a higher *K*m value (3.7 X 10^{-3} *M*) than propanil. A proposed pathway for the metabolism of propanil in rice plants was suggested and discussed. (Author abstract by permission, abridged. Copies of the thesis are available from University Microfilms, Order No. 74-21,637.)

75-0361. Schumacher, R. W. (Univ. of Kentucky, Lexington, KY). **Metabolism of metribuzin in soybeans and soil.** *Diss. Abstr. Int. 35(4): 1485B; 1974.*

The major nonpolar metabolite detected in the roots and shoots of soybean seedlings treated with ^{14}C-metribuzin was the deaminated parent compound. Two additional compounds, the diketo parent and the deaminated diketo parent, were also detected. The identity of these compounds was determined by cochromatography with standards and confirmed by mass spectral analysis. The levels of these compounds never accounted for more than 10% of the ^{14}C in the plant. Metribuzin was metabolized to these nonpolar metabolites in both the root and shoots. Neither ^{14}C-5 nor ^{14}C-3 metribuzin was readily metabolized to $^{14}CO_2$ in soybeans. The primary metabolic pathway of metribuzin detoxication in soybeans appeared to be the conversion of metribuzin to water soluble metabolites. The amount of ^{14}C in the polar fraction of plant extracts increased with time. After 8 days this fraction accounted for 40 and 55% of the ^{14}C in the shoots and roots, respectively. The compounds vary in size and are primarily cationic. Seven polar metabolites were separated; at least four of these were acid labile carbohydrate conjugates. ^{14}C-labeled metribuzin was degraded to $^{14}CO_2$ in soil, independent of soil organic matter content and amendment with glucose and yeast extract. Metribuzin metabolism was reduced in autoclaved soils. The triazinone ring was degraded stepwise. (Author abstract by permission, abridged. Copies of the thesis are available from University Microfilms, Order No. 74-23,007.)

75-0362. Taylor, T. E., Jr. (Univ. of Rhode Island, Providence, RI). **Fine structure of normal and chemically treated mammalian cells in culture.** *Diss. Abstr. Int. 35(5): 2044B; 1974.*

Previous studies revealed that rotenone and cadmium are highly toxic to mammalian cells in tissue culture, and that this test reflects toxicity to intact animals. The present study was initiated to determine the effects on the ultrastructure of cells treated with chemicals at concentrations where the plating efficiency was shown independently to be reduced. Rotenone treatment produced very specific ultrastructural damage. Rotenone primarily destroyed the matrix and cristae cells in tissue culture. Damage was assessed by comparing the number of mitochondria with at least 50% of the cristae intact to the total mitochondria. The midpoint of the mitochondrial survival curve at 10 hr of treatment was 7 X 10^{-6} *M* rotenone. The destructive effects of rotenone were not observed in isolated mitochondria, nor was there any visible effect in tissues of whole rats treated with sublethal doses of rotenone. The direct mechanism underlying mitochondrial disruption resulting from rotenone treatment is not very clear. In view of the colchicine-like action of rotenone at concentrations of 10^{-5} *M* and the fact that rotenone appears to selectively affect proteins containing disulfide groups, it is reasonable to speculate that rotenone binds to specific sites within the cell membranes. (Author abstract by permission, abridged. Copies of the thesis are available from University Microfilms, Order No. 74-24,702.)

75-0363. Flashinski, S. J. (Univ. of Wisconsin, Madison, WI). **Metabolism of dyfonate by soil fungi.** *Diss. Abstr. Int. 35(5): 2239B; 1974.*

Nine species of soil fungi were tested for their capacity to degrade the organophosphate insecticide dyfonate. A wide range of abilities was found for these species in degrading the insecticide to water-soluble products. *Rhizopus arrhizus* and *Mucor plumbeus* were the most active in degrading the insecticide, *Penicillium*

notatum was the least active, and *Aspergillus niger* was intermediate in its activity. This activity was evidenced by the production of increasing amounts of water-soluble ^{14}C-metabolites in the culture media. The water-soluble metabolites were nontoxic to mosquito larvae; hexane-extractable compounds were nontoxic to fruit flies, while hexane extracts from cultures of the less active fungal species were increasingly insecticidal. The metabolites detected by liquid scintillation counting, thin-layer chromatography, autoradiography, and gas-liquid chromatography were primarily dyfoxon, ethylethoxyphosphonothioic acid, ethylethoxyphosphonic acid, methyl phenyl sulfoxide, and methyl phenyl sulfone. None of the tested species was capable of utilizing the insecticide as the sole course of carbon. The degradation of dyfonate by *R. arrhizus* was optimal at pH 6.0 and 18-20°C. Atrazine and 2,4-D inhibited the degradation of the insecticide by the fungus only at concentrations of 50 ppm or higher. (Author abstract by permission, abridged. Copies of the thesis are available from University Microfilms, Order No. 74-18,932.)

75-0364. Shannon, L. R. (Iowa State Univ., Ames, IA). **Accumulation and elimination of dieldrin by channel catfish (*Ictalurus punctatus*).** *Diss. Abstr. Int. 35(5): 2515B; 1974.*

Dieldrin accumulation and elimination by channel catfish (*Ictalurus punctatus*) from exposure to water and food was determined in the laboratory. Immersion of catfish 4 to 14 in. in length for 6 hrs. in a solution containing 18.8 ppb (μg/liter) dieldrin resulted in higher dieldrin uptake by dorsal muscle of 7-10 in. catfish. Elimination of dieldrin was slowest in 12 to 14 in. fish. Twenty-eight day exposure of fish 6-9 in. and 14-16 in. to 75 ppt (ng/liter) dieldrin resulted in the larger catfish consistently accumulating more dieldrin than the smaller fish. After 28 days of elimination, dieldrin levels in both size groups were nearly equal. Balance between uptake and excretion was reached in 56 days in muscle of 6 in. catfish exposed to 13 ppt dieldrin, and muscle of fish exposed to 27 ppt was evidently approaching balance. Catfish exposed to 2 ppm (mg/kg) dieldrin through their diet accumulated significantly more dieldrin than did fish exposed to 77 ppt in water. Where fish were exposed in both food and water, dieldrin from both sources contributed to the total dieldrin load. Large catfish accumulated more dieldrin from food and water than did smaller catfish. After 28 days of elimination, levels of dieldrin were not significantly different in muscle of 6-9 in. and 14-16 in. catfish exposed via both food and water. (Author abstract by permission. Copies of the thesis are available from University Microfilms, Order No. 74-23,766.)

75-0365. Devochkin, F. A.; Ozdoyev, B. A. (Author address not given). **Vliyaniye gerbitsida daktala i falorana na agrokhimicheskiye svoystva pochvy, urozhay i kachestvo luka-sevka. [Effect of the herbicides dacthal and faloran on the agrochemical properties of soil, as well as the yield and quality of onion sets.]** *Doklady TSKhA (Timiryazev Sel'skokhoz. Akad.) 195:243-248; 1973.* (5 references) (Russian)

The effect of faloran, applied at a rate of 8 or 10 kg/ha, and dacthal, used in doses of 15 and 20 kg/ha, on onion sets, and on the agrochemical properties of the soil was studied. Both pesticides caused slight, temporary depression of the soil microbiological activity due to reduction of the nutrient (nitrate and phosphate) content in the soil, without causing permanent impairment of the agrochemical soil quality or of the onion sets.

75-0366. Somers, J. D.; Moran, E. T., Jr.; Reinhart, B. S. (Dept. Anim. Poult. Sci., Univ. Guelph, Guelph, Ontario, Canada). **Effect of external application of 2,4-D and picloram to the fertile egg on hatching success and early chick performance.** *Down Earth 29(3): 15-17; 1973.* (4 references)

Aqueous solutions of 2,4-D at recommended and at 10 times field rates, and a combination of 2,4-D at the higher level with picloram (4:1) were sprayed on eggs of Single Comb White Leghorn hens prior to incubation. No adverse effects resulted with respect to either incubation or subsequent performance of hatched chicks. In fact, increased weight gain was actually noted at 3-4 weeks of age in males given only 2,4-D. A follow-up experiment using graded levels of 2,4-D to an extreme of 20 times the average application rate failed to provoke any pre- or post-embryonic problems. In this series of experiments where the 2,4-D concentration was varied, recovery of herbicide from the shell surface paralleled increased dose levels. Comparable responses did not occur inside the egg. While the dose increased 20-fold, only a tripling of concentration occurred in the albumin plus yolk. Biological activity and/or incubation did not promote further *in ovo* contamination after initial wet contact.

75-0367. Law, F. C. P.; Eling, T. E.; Bend, J. R.; Fouts, J. R. (Nat. Inst. Environ. Health Sci., Research Triangle Park, NC 27709). **Metabolism of xenobiotics by the isolated perfused lung: comparison with in vitro incubations.** *Drug Metab. Disposit. 2(5): 433-442; 1974.* (40 references)

The metabolism of xenobiotics by an isolated perfused rabbit lung (IPL) was studied and the metabolites formed were compared with those produced in vitro by lung homogenate and microsomal fractions. Methadone, pentobarbital, and parathion were metabolized to the extent of 10-40% in the IPL, while chlorcyclizine and imipramine were apparently not degraded. These xenobiotics were biotransformed by homogenate and microsomal fractions of lung and liver which were fortified with NADPH. In general, the same metabolites

were formed by the IPL and subcellular lung and liver fractions. Methadone, pentobarbital, and parathion metabolism by the PL was examined in greater detail. The major metabolite of parathion was paraoxon. The appearance of metabolite in the perfusate of IPL was also monitored. The paraoxon concentration in the IPL perfusate plateaued in 10-20 minutes.

75-0368. Bastomsky, C. H. (McGill Univ. Clin., Royal Victoria Hosp., Montreal, Quebec, Canada). **Effects of a polychlorinated biphenyl mixture (Aroclor 1254) and DDT on biliary thyroxine excretion in rats.** *Endocrinology 95(4): 1150; 1974.* (38 references)

Treatment of male hooded rats with a polychlorinated biphenyl mixture (Aroclor 1254) (25 mg/kg i.p. daily for 4 days) caused a 4- to 5-fold increase in the 3-hour biliary excretion of ^{125}I-thyroxine (T_4). In the treated rats, the bile flow was increased and the ^{125}I-T_4 were greatly elevated. The proportion of biliary ^{125}I present as T_4-glucuronide was larger in PCB-treated than in control rats. PCBs also enhanced the uptake of thyroid ^{131}I and reduced the serum PBI concentrations. DDT (25 mg/kg i.p. daily for 4 days) did not affect the biliary excretion of ^{125}I-T_4, but did increase bile flow and the biliary clearance rate of plasma ^{125}I-T_4. It also caused a marginal elevation in the B/P ratios and increased the proportion of biliary ^{125}I present as T_4-glucuronide. DDT did not affect the uptake of thyroid ^{131}I or the serum PBI concentrations. PCB treatment, but not DDT treatment, also reduced the binding of thyroid hormone to serum proteins, as shown by the enhanced resin uptake of ^{125}I-triiodothyronine (T_3) from the serum.

75-0369. Courtenay, W. R. Jr.; Roberts, M. H. Jr. (Aquatic Sci. Inc., Boca Raton, FL 33432). **Environmental effects on toxaphene toxicity to selected fishes and crustaceans.** *EPA Report No. EPA-R3-73-035, April 1973, 73p.* (40 references)

Lethal limits (96 hr TL50) for toxaphene, salinity, temperature, and dissolved oxygen in water and their interactive effects were determined using developmental stages of selected warm-temperate and subtropical fishes and crustaceans. Species tested include *Micropterus salmoides* (largemouth bass), *Mugil cephalus* (striped mullet), *Mugil curema* (silver mullet), *Trachinotus carolinus* (pompano), *Callinectes sapidus* (blue crab), *Penaeus duorarum* (pink shrimp), *Sesarma cinereum* (drift line crab), and *Rhithropanopeus harrisii* (mud crab). Earliest developmental stages of fish species were more resistant to high levels of salinity and to low levels of dissolved oxygen, but were more sensitive to high temperatures than wery later stages. Decapod larvae showed increasing tolerance to toxaphene with increasing developmental age. Synergistic effects were noted between toxaphene and the 3 environmental factors. Sac-fry of the striped mullet showed enlarged cells and increased numbers of cells in glandular tissue in the head on exposure to high concentrations of toxaphene. Larvae of *S. cinereum*, *C. sapidus*, and *R. harrisii* exposed to extreme concentrations of toxaphene underwent destruction of the hepatopancreas and constriction of the intestine.

75-0370. Balba, M. H.; Saha, J. G. (Chem. Biol. Res. Inst., Res. Br., Agr. Canada, Ottawa, Ontario, Canada). **Metabolism of lindane-^{14}C by wheat plants grown from treated seed.** *Environ. Lett. 7(3): 181-194; 1974.* (15 references)

In the Canadian Prairie Provinces, wheat seeds are treated with lindane at about 500 ppm for the control of wireworms in cereal. Canthatch wheat seed was treated with lindane-^{14}C (480 ppm) and planted. Total ^{14}C residues were determined in randomly chosen 19-day-old seedlings and the grain, chaff, straw, and roots of mature plants. Of the methanol extractable ^{14}C-residues in the seedlings, roots, straw, and chaff, 39%, 34%, 8%, and 0%, respectively, were due to lindane. The grain had no detectable radioactivity. Several metabolites were identified in the root samples by gas chromatography and mass spectrometry: *m*- and/or *p*-dichlorobenzene; 1,3,5-, 1,2,4-, and 1,2,3-trichlorobenzene; 1,2,3,4-tetrachlorobenzene; 1,2,4,5- and/or 1,2,3,5-tetrachlorobenzene; 8-PCCH; and pentachlorobenzene. Several chlorophenols were also indicated by thin-layer chromatographic analysis, and chlorobenzenes were found in the other tissues.

75-0371. Karlsson, B.; Persson, B.; Sodergren, A.; Ulfstrand, S. (Dept. Zoophysiol., Univ. Lund, Lund, Sweden). **Locomotory and dehydrogenase activities of redstarts *Phoenicurus phoenicurus* L. (Aves) given PCB and DDT.** *Environ. Pollut. 7(1): 53-63; 1974.* (17 references)

Caged redstarts (*Phoenicurus phoenicurus* L.), a turdine passerine, trapped during the autumn migration were fed mealworms injected with 11.0 μg PCB or 10.5 μg DDT. Over the course of 12 days, the birds ingested 132 μg PCB or 126 μg DDT. There was a statistically insignificant trend toward increased locomotor activity in the PCB-treated birds during the early night hours (i.e., at the peak of normal migratory activity). Similarly, there was a tendency among both the PCB- and DDT-treated birds toward altered dehydrogenase activities, suggesting metabolic changes presumably due to the contaminants accumulated during treatment. The organ residue levels in the treated birds were comparable to those reported from wild birds in the field. The changes in the dehydrogenase activities were most pronounced in the liver and breast muscle tissues of the DDT-treated birds.

75-0372. Elder, G. H. (Dept. Chem. Pathol., Welsh Nat. Sch. Med., Cardiff, Wales). **The metabolism of**

porphyrins of the isocoproporphyrin series. *Enzyme (Basel) 17(1-2): 61-68; 1974.* (6 references)

Porphyrins of the isocoproporphyrin series were isolated from the bile-stained duodenal fluid and feces of 5 patients with porphyria cutanea tarda symptomatica (PCTS), the feces and urine of 5 additional PCTS patients, the feces of 6 patients with variegate porphyria, the feces of 12 normal subjects, and the fistula bile of nine female Wistar rats. Porphyrins of the isocoproporphyrin series accounted for 15-35% of the fecal porphyrins in the PCTS patients and 9-21% of the total porphyrin excreted in the urine and feces. Trace amounts were found in the feces of four normal subjects and two patients with variegate porphyria. Dicarboxylic porphyrin, coproporphyrin, an unidentified porphyrin of the isocoproporphyrin series, and penta-, hexa-, and hepta-carboxylic porphyrins were found in the duodenal fluid of the PCTS patients. The same pattern was seen in the fistula bile of rats with hexachlorobenzene-induced porphyria. Bile from normal rats contained no porphyrins of the isocoproporphyrin series. Evidence was obtained that in PCTS, dehydroisocoproporphyrin(ogen) is produced in the liver, excreted in the bile, and metabolized by intestinal microorganisms to iso- and deethyliso-coproporphyrin.

75-0373. Valentine, D. W.; Soule, M. (Dept. Biol., Univ. California, San Diego, La Jolla, CA 92037). **Effect of *p,p'*-DDT on developmental stability of pectoral fin rays in the grunion, *Leuresthes tenuis*.** *Fish. Bull. 71(4): 921-926; 1973.* (18 references)

Breeding pairs of grunion (*Leuresthes tenuis*) were exposed to *p,p'*-DDT (0.001, 0.01, 0.1, 0.4, 0.7, 1.0, 10, 100, and 500 ppb) in a flowing water system. The two highest concentrations proved lethal to the grunion fry produced by the breeding pairs exposed to the pesticide. Increasing pectoral fin ray asymmetry was seen with increasing pesticide concentration below 100 ppb. These increases were statistically significant. A second experiment, utilizing a recirculating static water system, was performed to determine inherent differences in the level of pectoral ray fin asymmetry among fish from different localities. The results for the grunion fry paralleled previously published results from adult grunion. Fish from the relatively polluted southern California region had higher asymmetry levels than those from Baja California.

75-0374. Mizyukova, I. G.; Petrun'kin, V. Ye.; Lysenko, N. M.; Kurchatov, G. V. (All-Union Sci. Res. Inst. Hyg. Toxicol. Pesticides, Polymers and Plastic Materials, Kiev, USSR). **Vzaimosvyaz' mezhdu stroyeniyem i detoksifitsiruyushchey aktivnost'yu nekotorykh tiolov i aminov pri intoksikatsii geksakhlorbutadienom. [Relation between the structure and detoxifying action of several thiols and amines during hexachlorobutadiene poisoning.]** *Fiziol. Aktiv. Veshch. 5: 22-24; 1973.* (4 references) (Russian)

Relationships between the structure and detoxifying power of thiols and amines against hexachlorobutadiene were studied. Rats poisoned with LD50 (300 mg/kg) or larger doses of hexachlorobutadiene by oral administration were given thiols or amines 20 to 30 min before and immediately after poisoning. The antidotes were administered orally in two-fold molar excess relative to the poison. As determined from the survival rates, mercaptide, cystein, and especially unithiol were highly effective antidotes for hexachlorobutadiene. The ethanolammonium salts of 2,3-dimercaptopropanesulfonic acid were even more powerful antidotes than unithiol, while the ethanolamines themselves, either alone or combined with unithiol, were ineffective. The presence of sulfide sulfur and the simultaneous increase in the distance between the dimercaptopropyl and sulfo groups considerably reduced the detoxifying power of the preparations relative to unithiol. Monothiols were less effective than dithiols. The replacement of one of the mercapto groups by an amino group in unithiol considerably reduced the detoxifying activity.

75-0375. Brantsevich, L. G.; Molozhanova, Ye. G.; Remizova, L. B. (T. G. Shevchenko Kiev State Univ., Kiev, USSR). **Vliyaniye sevina kak insektitsidnogo preparata na mikrofloru pochvy. [Effect of sevin as an insecticidal preparation on soil microflora.]** *Fiziol. Aktiv. Veshchestva. 5: 127-129; 1973.* (5 references) (Russian)

The residue dynamics of carbaryl in soil and its effects on soil microorganisms were studied. The carbaryl content in the soil increased during the first 35 days after application for control of potato plant pests and decreased, most intensely in sandy soil, thereafter. Carbaryl strongly inhibited nitrifying bacteria, aerobic nitrogen-fixing bacteria, and fungi, initially; then, the inhibition was attenuated. The microorganism count was again markedly reduced around the 100th day of the experiment, but had normalized after 135 days. Nitrifying bacteria were slightly stimulated. The microorganisms were most strongly inhibited in sandy soil, while the presence of organic material in chernozem and peaty soils weakened this effect.

75-0376. Bringmann, G.; Kuehn, R. (Author address not given). **Quantitative Bestimmung der biologischen Schadwirkung herbizider Phenylharnstoff-Derivate gegen Algen (Modellorganismus: *Scenedesmus quadricauda*). [Qualitative determination of the injurious effect of phenylurea herbicides on algae (model organism: *Scenedesmus quadricauda*).]** *Gas-Wasserfach Wasser/-Abwasser 115(8): 364-366; 1974.* (German)

The threshold values of the injurious effects of 12 different phenylurea herbicides on *Scenedesmus quadricauda* in aquatic culture were determined quantitatively by a turbidimetric method. Phenylurea herbicides were found to inhibit the cell division of *Scenedes-*

mus quadricauda as a function of concentration. The limiting values for the injurious effect were determined to be 3.4 μg for neburon; 5.3 μg for diuron; 10.5 μg for chlorobromuron; 14 μg for chloroxuron; 66 μg for methabenzthiazuron; 90 μg for monuron; 100 μg for benzthiazuron; 125 μg for metobromuron and monolinuron; 165 μg for fluometuron; 295 μg for cycluron; and 530 μg for buturon.

75-0377. Lakota, S. (IPO, Pszczyna, Poland). **Proba klasyfikacji pestycydow pod wzgledem toksycznosci w stosunku do ryb slodkowodnych. [Attempt to classify pesticides according to toxicity for fresh water fish.]** *Gaz Woda Tech. Sanit. 48(8): 270-271; 1974.* (Polish)

In previous studies it was shown that the toxicity of pesticides to fish depends on physical-chemical characteristics of the water, the type of pesticide, and the species and stage of development of fish. Younger fish and species with vigorous metabolism are generally more sensitive, while older fish and species with slow metabolism are more resistant. It is recommended that in studies on toxicity at least two varieties of fish with different speeds of metabolism be used. Employing carp and trout as representative species and a concentration causing 50% mortality after 96 hours of contact as the index of toxicity, different pesticides were classified into 4 groups. Class I comprises highly toxic pesticides with LC50 < 0.5 mg/l water. It includes almost all chlorinated hydrocarbon insecticides, some organophosphate insecticides, and some fungicides and herbicides. Class II is the toxic pesticides. These are somewhat less dangerous for fish than those in Class I. The LC50 is 0.5 - 5.0 mg/l. They include pesticides from all groups of compounds, including diuron and the majority of the organophosphate compounds. Class III comprises the slightly toxic pesticides. They pose little danger, with a contact toxicity of LC50 5-50 mg/l, and include the majority of herbicides. Class IV includes those considered practically harmless. The contact toxicity LC50 is greater than 50 mg/l. They include among others dalapon, Antyperz (TCA), Chwastox (MCPA), and Herbatox (calcium chlorate). It was also found that liquid preparations were more toxic than powdered forms, and chemically pure substances less toxic than commercial preparations. Most were significantly more toxic at higher temperatures, but with some, such as 2,4-D and DDT, the toxicity decreased with increasing water temperature.

75-0378. Forster, M. S.; Gellert, R. J.; Heinrichs, W. L. R. (Dept. Obstet., Univ. Washington Sch. Med., Seattle, WA). **The estrogenic capacity of organochlorine pesticides.** *Gynecol. Invest. 5(1): (1): 35-36; 1974.*

The ability of *o,p'*-DDT to reduce plasma gonadotrophin levels in castrated female rats and to produce the persistent estrous syndrome was demonstrated in neonatally-treated rats. Homologs of DDT were tested as inhibitors of in vivo and in vitro specific binding of ^{3}H-estradiol ($8.7 \times 10^{-9} M$) in uterine cytosol and nuclear fractions. In vitro binding was inhibited to *o,p'*-DDT and *o,p'*-DDE ($1.4 \times 10^{-4} M$), but *o,p'*-, m,p'-, *and p,p'*-DDD (TDE), *p,p'*-DDE, *p,p'*-DDT, and DDA showed no inhibition. Treatment of pregnant females (days 15-19 of gestation) with *o,p'*-DDD, *o,p'*-DDT, and DDA (10 mg/day, p.o.) did not cause the persistent estrous syndrome to develop in the offspring. Pups receiving *o,p'*-DDD or *o,p'*-DDT (1 mg/day for 3 days, SQ) showed the syndrome in females but males suffered no disturbance of the reproductive development. Treatment of pups with DDA and *o,p'*-DDE was ineffective. Plasma gonadotrophin responses to ovariectomy of adults with persistent estrous syndrome were blunted. The data confirms the estrogenic capacity of large amounts of *o,p'*-DDT in the uterus and central nervous system and demonstrates a selective estrogenic effect of other organochlorine pesticides in these organs.

75-0379. Inokuchi, K.; Osari, R.; Masaki, N.; Wakai, S.; Sone, K.; Iwami, T. (Sch. Pharmacol., Fac. Med., Hirosaki Univ., Hirosaki, Aomori, Japan). **[Studies on the acute toxicity of an insecticide, Krecalvin, part 1. LD50 and acute toxic signs in mice and rats.]** *Hirosaki Igaku (Hirosaki Med. J.) 26(2): 149-166; 1974.* (3 references) (Japanese)

The acute toxicity of an insecticide, Krecalvin, a molecular compound of one mole of calcium *O*-methyl *O*-(2,2-dichlorovinyl)phosphate and two moles of dichlorvos, was determined on DD mice and Wistar rats by subcutaneous injection, by oral administration, and by topical application. LD50s found for mice were 29.3 and 30.1 mg/kg s.c., 250 and 347 mg/kg p.o., and 3130 and 3040 mg/kg top., for males and females, respectively. Those for rats were 46.7 and 34.8 mg/kg s.c., 156 and 159 mg/kg p.o., and 3163 and 4850 mg/kg top., for males and females, respectively. The figures obtained were larger than those for parathion and dichlorvos indicating that Krecalvin is less toxic. The symptoms were the same as those manifested by the same animals intoxicated by common organophosphorus pesticides. They appeared soon after application; however, the majority of intoxicated animals recovered about 24 hr later. Examination was continued for one week.

75-0380. Hattori, K.; Sato, H.; Tsuchiya, K.; Yamamoto, N.; Ogawa, E. (Hokkaido Inst. Public Health, Sapporo, Japan). **[Toxicological studies on the effects of chemicals on birds, part 1. Acute oral toxicity and cholinesterase inhibition of these organophosphorus insecticides in Japanese quail.]** *Hokkaidoritsu Eisei Kenkyusho-Ho (Rep. Hokkaido Inst. Pub. Health) 24: 35-38; 1974.* (6 references) (Japanese)

The acute oral toxicity of three organophosphorus insecticides (fenitrothion, trichlorfon, and dichlorvos) to Japanese quail, *Coturnix coturnix japonica*, was deter-

mined at five weeks of age by administering 0.5 ml of the diluted emulsion of each formulation (50% EC). The dose rates were 240, 120 and 60 mg/kg for fenitrothion; 180, and 90 mg/kg for trichlorfon; and 96, 48 and 24 mg/kg for dichlorvos. The LD50s values p.o. were 84.85 and 73.87 mg/kg, 73.11 and 83.98 mg/kg, and 22.01 and 25.72 mg/kg for fenitrothion, trichlorfon, and dichlorvos in male and female Japanese quail, respectively. Trichlorfon appeared to cause a marked decrease in plasma and brain cholinesterase activity. The toxic symptoms were the same as those in warm-blooded animals.

75-0381. Yamamoto, I.; Kawai, Y.; Hori, Y.; Shitara, Y. (Hokkaido Institute of Public Health, Sapporo, Hokkaido, Japan). **[Studies on the metabolism of organochlorine compounds, part 1. Distribution of *p,p'*-DDT and polychlorobiphenyls.]** *Hokkaidoritsu Eisei Kenkyusho-Ho (Rep. Hokkaido Inst. Pub. Health) 24: 39-46; 1974.* (16 references) (Japanese)

Olive oil solutions of *p,p'*-DDT, 4,4'-dichlorobiphenyl, and 3,4,3',4'-tetrachlorobiphenyl were administered into the stomachs of 45 day old male Wistar rats once or at the rate of 10 mg/kg once a day for 30 days. Twenty-four hr after administration, the rat was sacrificed and the organs were weighed and analyzed for determination of the chemicals. Only the liver weights of the rats given *p,p'*-DDT for 30 days showed a significant increase (in proportion to the body weight). The activities of LDH, GPT and GOT in serum did not show any alteration. Concentrations of *p,p'*-DDT were higher in skin and intestines, and lower in brain, heart, and spleen. The residual amount of *p,p'*-DDT was larger in the rats dosed 30 times. Residues of *p,p'*-DDD (TDE) and *p,p'*-DDE were found in brain, heart, spleen, kidney, liver, lung, muscle, intestines, and skin, with *p,p'*-DDD content being higher in the liver.

75-0382. Hattori, K. (Hokkaido Institute of Public Health, Sapporo, Hokkaido, Japan). **[Toxicity of difenphos (abate) in amphibia.]** *Hokkaidoritsu Eisei Kenkyusho-Ho (Rep. Hokkaido Inst. Pub. Health) 24: 152-153; 1974.* (4 references) (Japanese)

As difenphos is very effective in controlling larvae of gnats and it is important to control gnats in Hokkaido, the frequency of difenphos application will probably increase in the near future. To investigate potential effects of difenphos on the ecosystem, its acute toxicity to tadpoles and eggs of two species of amphibia, *Rana chensinensis* and *Hynobius retardatus* was determined. At 100 ppm, the 100 eggs of *R. chensinensis* completely stopped developing after two days and no hatching was seen after 10 days. At 10 ppm, the development of the eggs was delayed, and 91 tadpoles died after 10 days. At 1 ppm 118 tadpoles survived after 10 days. In *H. retardatus* at 100 ppm no hatching occurred; at 10 ppm 60 tadpoles survived, and at 1 ppm 64 tadpoles survived after 10 days. The LC50 was 4.18 ppm for young *R. chensinensis* and 3.97 ppm for young *H. retardatus*. In *R. chensinensis* one anomalous tadpole was found with curled tail (60°), and in *H. retardatus* three abnormal tadpoles were found with curled tails (30-60°).

75-0383. Hattori, K. (Hokkaido Inst. Pub. Health, Sapporo, Hokkaido, Japan). **[Toxicological studies on the effects of chemicals on birds, part 2. Acute oral toxicity of fenitrothion, trichlorfon, and dichlorvos in the common pigeon.]** *Hokkaidoritsu Eisei Kenkyusho-Ho (Rep. Hokkaido Inst. Pub. Health) 24: 154; 1974.* (1 reference) (Japanese)

The acute oral toxicity of fenitrothion, trichlorfon, and dichlorvos to *Columba livia* was determined by using four dose rates (15-120 mg/kg) and administering 0.5 mg/100 g body weight of each emulsion via stomach tube to two birds per dose level. The p.o. LD50 values were 42.25, 179.9, and 16.79 mg/kg, respectively, for fenitrothion, trichlorfon, and dichlorvos.

75-0384. Harris, S. J.; Cecil, H. C.; Bitman, J. (Biochem. Lab., Anim. Physiol. Genetics Inst., Agr. Res. Serv., U. S. Dept. Agr., Beltsville, MD 20705). **Effect of several dietary levels of technical methoxychlor on reproduction in rats.** *J. Agr. Food Chem. 22(6): 969-973; 1974.* (29 references)

Technical methoxychlor (MeOCl) was compared with estrogen to determine direct effects upon mating and reproduction of adult rats as well as indirect latent effects, vaginal opening time, and reproductive performance of offspring. Mature female rats were fed MeOCl before mating and throughout pregnancy and lactation. One thousand parts per million of MeOCl had no effect on reproduction. Higher levels (2500 and 5000 ppm) reduced the number that mated, and only one rat littered. If these adult rats were fed uncontaminated feed, normal reproduction returned. Female pups from mothers fed 1000 ppm had early vaginal openings and reduced reproduction when they attained maturity and were mated. Males from mothers fed 1000 ppm of MeOCl also had impaired reproductive behavior. This impairment indicates that methoxychlor transmitted through the placenta or mother's milk can affect reproduction adversely. This study showed that technical MeOCl at very high dosages adversely affects reproduction in adult rats and can affect the reproduction of the young in the next generation. (Author abstract reprinted by permission of the American Chemical Society)

75-0385. Lichtenstein, E.; Fuhremann, T. W.; Schulz, K. R. (Dept. Entomol., Univ. Wisconsin, Madison, WI 53706). **Translocation and metabolism of [^{14}C]phorate as affected by percolating water in a model soil-plant ecosystem.** *J. Agr. Food Chem. 22(6): 991-996; 1974.* (11 references)

A model ecosystem consisting of soils, plants, and water was utilized with corn grown in a [^{14}C]phorate treated soil layer on top of an insecticide-free soil, while water was periodically percolated through this system. Utilizing different soil types and moist soil through which no water was percolated, the interrelationships of movement and metabolism of [^{14}C]phorate in soils, the effects of percolating water on these processes, and the penetration, translocation, and metabolism of the insecticides in corn were investigated. Under both percolating and nonpercolating conditions, 12% of the applied radiocarbon had moved into the lower layers of agricultural soils as phorate sulfoxide and phorate sulfone. Phorate still present in the upper layers of all soils moved only in a quartz sand. Water percolated through a quartz sand, a Plainfield sand, and a Plainfield sand-silt loam mixture contained 16.4, 2.8, and 1.8% of the applied radioactivity, respectively, identified as phorate (with quartz sand only), phorate sulfoxide, and phorate sulfone. Although all soils still contained phorate, only its metabolites were found in plants. Roots contained primarily phorate sulfone and some phorate sulfoxide, while greens also contained phoratoxon sulfoxide and phoratoxon sulfone. It appears that roots of corn plants absorbed phorate from the soil and metabolized it into its sulfoxide and sulfone or absorbed these metabolites directly from the soil, then translocated them into the greens, where their further oxidation into their oxygen analogs (phosphorothiolates) presumably occurred. Roots of plants grown in a quartz sand contained 2.5-5 times more phorate-derived materials than those grown in an agricultural soil. However, the amounts of ^{14}C-labeled materials that had been translocated into the corn greens were similar with all soils, indicating that the uptake and translocation of chemicals from soil are to a large extent governed by physiological processes of the corn plant itself. (Author abstract reprinted by permission of the American Chemical Society)

75-0386. Beland, F. A.; Farwell, S. O.; Geer, R. D. (Dept. Chem., Montana State Univ., Bozeman, MT). **Anaerobic degradation of 1,1,1,2-tetrachloro-2,2-bis(*p*-chlorophenyl)ethane (DTE).** *J. Agr. Food Chem. 22(6): 1148-1149; 1974.* (7 references)

DDE (1,1-dichloro-2,2-bis(*p*-chlorophenyl)ethylene) is the major product from the anaerobic degradation of 1,1,1,2-tetrachloro-2,2-bis(*p*-chlorophenyl)ethane (DTE). This is the same reaction that is observed with electrochemical reduction. It is postulated that electrochemistry may be used as a means of predicting the products formed from the anaerobic reduction of organochlorine compounds. (Author abstract reprinted by permission)

75-0387. Kuga, T.; Watanabe, Y.; Kono, Y.; Naito, J. (Dept. Pharmacol. Toxicol., Inst. Food Microbiol., Chiba Univ., Chiba, Japan). **Pharmacological studies of some vinyl phosphate insecticides.** *Jap. J. Pharmacol. 23(Suppl.): 24; 1973.*

In urethane anesthetized rats, p.o. administered dichlorvos and 2-chloro-1-(2,4-dichlorophenyl)vinyl diethyl phosphate caused a striking rise in blood pressure and respiratory failure which were antagonized completely by toxogonin or a large dose of atropine. These effects of the insecticides were due in part to their action on the central nervous system, as 2-PAM did not antagonize the effects. Administration of 2-chloro-1-(2,4,5-trichlorophenyl)vinyl dimethyl phosphate slightly increased the blood pressure and inhibited respiration. The neuromuscular transmission in rat gastrocnemius muscle was facilitated by all three compounds. Contractile responses of isolated guinea-pig ileum to acetylcholine or to electrical coaxial stimulation were augmented by low concentrations of 2-chloro-1-(2,4-dichlorophenyl)vinyl diethyl phosphate and dichlorvos, but were depressed by 2-chloro-1-(2,4,5-trichlorophenyl)vinyl dimethyl phosphate. The order of inhibitory effects of the compounds on the rat serum cholinesterase activity is as follows: 2-chloro-1-(2,4-dichlorophenyl)vinyl diethyl phosphate, dichlorvos, and 2-chloro-1-(2,4,5-trichlorophenyl)vinyl dimethyl phosphate.

75-0388. Ohmiya, Y.; Nakai, K. (Dept. Pharmacol., Akita Univ. Sch. Med., Akita, Japan). **Protein-mediated transfer of DDT to adipose tissue.** *Jap. J. Pharmacol. 23(Suppl.): 98; 1973.*

About 20% of DDT given in Krebs-Ringer solution was transferred to fragments of rat adipose tissue after 2 hr incubation at 37°C. Addition of albumin at the range of 0.04 to 1.0% to the solution increased the transfer of DDT in a manner proportionate to the concentration of albumin. Palmitate inhibited the acceleration of transfer mediated by albumin. Replacing the Krebs-Ringer solution by 2% triglyceride suspension reduced the transfer of DDT to 3-4%. When rat plasma was used as the incubation medium, the degree of transfer was about the same as that observed using Krebs-Ringer solution. Efflux experiments showed that adipose tissue scarcely released DDT to albumin solution. After 4 hr incubation the amount of DDT remaining in the tissue was about 96% of the initial content. Triglyceride suspension had no effect in releasing DDT from the tissue. It is suggested that lipid may be important as a storage site of DDT and that albumin may serve only as a carrier.

75-0389. Koelle, G. B. (Dept. Pharmacol., Med. Sch., Univ. Pennsylvania, Philadelphia, PA 19104). **The electron microscopic localization of acetylcholinesterase and pseudocholinesterase in autonomic ganglia.** *Jap. J. Pharmacol. 24(Suppl): 11-12; 1974.* (10 references)

As one of the steps in an experiment to gain direct evidence of the cytological localization of AChE and

ChE in the normal superior cervical ganglion of the cat, it was necessary to produce near-total, selective inactivation of ChE and AChE in vivo prior to sacrifice and removal and fixation of tissues. Selective inactivation of ChE can be obtained by the i.v. injection of Iso-OMPA (tetramonnoisopropyl pyrophosphortetramide) at 6.0 μmole/kg. However, to inactivate essentially all peripheral AChE while simultaneously sparing a substantial portion of the ChE, it was necessary to first give a high dose of 10-(α-diethylaminopropionyl) phenothiazine HCl (200 μmole/kg, i.v.), a reversible ChE inhibitor, followed by 2-diethoxyphosphinylthioethyldimethylamine acid oxalate (1.0 micromole/kg) or isopropyl methylphosphonofluoridate sarin, (2.0 micromole/kg). This procedure afforded data indicating that AChE is present at both the presynaptic and postsynaptic membrances. ChE is likewise present at these sites, as well as in capsular glial cells. Thus the disappearance of most of the ganglionic AChE following preganglionic denervation is due to the loss of a trophic factor which is essential for maintaining the enzyme at the postsynaptic site, rather than due to the breakdown of the presynaptic terminals themselves.

75-0390. Ogawa, E. (Dept. Pharmacol., Sch. Med., Gumma Univ., Maebashi, Japan). **Heavy metal poisoning and antidotes.** *Jap. J. Pharmacol. 24(Suppl.): 17; 1974.*

In experiments to determine the effects of principal chelating agents on the elimination of mercury compounds from the living body, tracer doses of the radionuclides were administered p.o. or i.p., and whole-body radioactivity was measured daily for 3 or 7 days. Immediately after administering nuclides, various chelating agents were given every 24 hr for 3 or 7 days and their effects on the retention, excretion, and distribution of the nuclide examined. EDTA and DTPA were ineffective in treatment of mercury poisoning. Dimercaprol (BAL) decreased the retention of $HgCl_2$ and phenylmercuric acetate, but often increased the mercury concentration in the brain in experiments with phenylmercuric acetate, EMC and MMC. When animals were fasted, all heavy metals tested were retained in the body. When feeding was restored, the body tended to return to a normal state. Thus feeding is important in the absorption, distribution, and elimination of heavy metals.

75-0391. Halter, M. T.; Johnson, H. E. (Dept. Fish. Wildl., Michigan State Univ., East Lansing, MI 48824). **Acute toxicities of a polychlorinated biphenyl (PCB) and DDT alone and in combination to early life stages of coho salmon (*Oncorhynchus kisutch*).** *J. Fish. Res. Bd. Can. 31(9): 1543-1548; 1974.* (15 references)

Egg hatchability, mean time to hatching, and alevin survival and growth decreased when coho salmon (*Oncorhynchus kisutch*) eggs and alevins were exposed at 12-14°C to 4.4 μg/liter Aroclor 1254 or higher until 4 wk after hatching, and to 15 μg/liter or more until 2 days before hatching. Premature hatching occurred in all egg groups exposed to the PCB. The median survival times of fry exposed to Aroclor 1254-DDT combinations for two wk were similar to those after exposure to the various concentrations of DDT alone. The more rapid reaction time to DDT is suggested as the basis for lack of additive toxicity. (Author abstract by permission)

75-0392. McLeese, D. W. (Dept. Environ., Biol. Sta., St. Andrews, N. B., Canada). **Toxicity of phosphamidon to American lobsters (*Homarus americanus*) held at 4 and 12 C.** *J. Fish. Res. Bd. Can. 31(9): 1556-1558; 1974.* (9 references)

The concentration of phosphamidon that kills 50% of lobsters in 96 hr (96-hr LC50) at 12°C is 50 μg/liter and the lethal threshold is 18 μg/liter whether determined in static or running water tests. The 96-h LC50 at 4 C is 180 μg/liter and the lethal threshold is 28 μg/liter, or possibly as low as 18 μg/liter. Phosphamidon is 50-60 times less toxic to lobsters than fenitrothion. (Author abstract by permission)

75-0393. Pal, R. (Vector Biol. Control, World Health Org., Geneva, Switzerland). **The present status of insecticide resistance in anopheline mosquitoes.** *J. Trop. Med. Hyg. 77(2): 28-41; 1974.* (23 references)

The problem of insecticide resistance in anopheline mosquitoes has created more concern and repercussions than any other problem in applied medical entomology during the last 25 years. This concern stems from the serious challenge that resistance now poses to the first attempts to eradicate insect-borne diseases on a world-wide basis. The anopheline species resistant to insecticides are enumerated; in one important malaria vector, *Anopheles albimanus*, resistance has developed to chlorinated hydrocarbon, malathion, and carbamate insecticides. The problem is reviewed with emphasis on the progression and regression of resistance to DDT in some anopheline species and the development of resistance in some anopheline species to malathion and carbamate insecticides. Determination of the LT50 values and interpretation of the results based on time-mortality regression lines are also discussed, as is the implication of resistance in principal malaria vectors.

75-0394. Khokhryakova, V. S.; Shustova, V. P. (All-Union Sci. Res. Inst. Chemical Plant Protection Agents, USSR). **Razrusheniye DDT kul'turami pochvennykh drozhzhey v zhidkikh sredakh. [Destruction of DDT by soil yeast fungi in liquid media.]** *Khim. Sel. Khoz. 12(8): 26-28; 1974.* (4 references) (Russian)

The destruction of DDT by soil yeast fungi in nutrient solutions incubated at 28-30°C was studied. The test solutions contained 500 μg DDT or 4 μg/ml. No

traces of DDT were found after one week in cultures of *Hanseniaspora antillarum, Sporobolomyces holsaticus, Cryptococcus tereus,* and previously adapted strains. The DDT residue found after one week was between 10 and 100 μg in cultures of *Torula humicola, Pichia farinosa, P. vanriji, Hancenula suaveolens, Schwanniomyces olluvias, Cryptococcus terreus, Saccharomyces pretoriensis, Debaryomyces globosus, Kluyveromyces polysporus, Zygofabospora marxiana, Rhodotorula glutinus* var. *rubescens*, and DDT-adapted species. The DDT residues were between 100 and 200 μg in the cultures of *Candida scotti, Lypomyces starkyi, Hanseniaspora antillarum, Sporobolomyces holsaticus, Saccharomyces transvalensis,* and *Williopsis saturnus*. The residual DDT was between 200 and 300 μg in the cultures of *Hansenula beijerinckii, Lympomyces lipoferus,* and *Schwanniomyces occidentalis,* while it was between 300 and 400 μg in the culture of *Zygowillopsis californicus. Hanseniaspora antillarum, Sporobolomyces holsaticus, Cryptococcus terreus,* and DDT-adapted strains metabolized DDT to products undetectable by thin-layer chromatographic methods, while *Pichia farinosa, Hansenula beijerinckii,* and *Kluyveromyces polysporus* nearly quantitatively dechlorinated DDT and DDD (TDE). Cultures of *Pichia vanriji, Saccharomyces pretoriensis,* and *Rhodotorulla glutinis* var. *rubescens* and others actively metabolized DDT to water-soluble products but caused slight accumulation of DDT at the same time. Cultures metabolizing DDT to DDD were unable to attack DDD. The degradation was due to the activity of intracellular enzyme systems.

75-0395. Mel'nikov, N. N. (All-Union Sci. Res. Inst. Chemical Plant Protection Agents, USSR). **Pestitsidy i okruzhayushchaya sreda (razlozheniye ariloksialkankarbonovykh kislot i ikh proizvodnykh v ob'ektakh okruzhayushchey sredy). [Pesticides and the environment (degradation of aryloxyalkanecarboxylic acids and their derivatives in environmental objects).]** *Khim. Sel. Khoz. 12(8): 70-74; 1974.* (37 references) (Russian)

Studies on the toxicity, persistence, and metabolism of aryloxyalkane carboxylic acids and their derivatives are reviewed. The residue level of 2,3,7,8-tetrachlorodibenzodioxin, a compound with very high toxicity, embryotoxicity and teratogenic action, in 2,4,5-T is limited to 0.5 mg/kg. The 2,4-D and 2,4-dichlorophenol residue in milk from cows fed 300 mg 2,4-D per kg of body weight was less than 0.05 mg/kg. 2,4-D and its derivatives are eliminated from the animal organism rather rapidly in unchanged form. Neither 2,4-D nor 2M-4C (MCPA) accumulate in the animal organism. No residues of 2,4-D were found in the organs of cows fed 5.5 g 2,4-D daily for 106 days. Aryloxyalkane carboxylic acids are persistent in pure, natural water, but are hydrolyzed at high temperature and in strongly acidic water. Metabolism of 2,4-D and its derivatives to 2,4-dichlorophenyl, and further to 4-chloropyrocatechol and then to 1,2,4-trioxybenzene by UV irradiation of its aqueous solutions was observed. These compounds do not accumulate in recipients due to their adsorption by suspended matter, and due to degradation by microorganisms. The LC50 of 2,4-D, 2,4-DP, 2M-4C, 2,4,5-T, and 2,4,5-TP in fish were determined to be 100-1160, 19, 32-210, 2.4-55, and 83 mg/liter, respectively. Both 2,4-D and its derivatives are rapidly destroyed by soil microorganisms. Hydroxylation of the aromatic ring, cleavage of the ester bond, destruction of the aromatic ring, and formation of com pounds with glucose and amino acids may be the basic transformations of 2,4-D and its analogs in plants.

75-0396. Hutson, D. H. (Tunstall Lab., Shell Res. Ltd., Kent, England). **Mechanisms of detoxication of organophosphates in mammals.** *Meded. Fac. Landbouwwetensch. Rijksuniv. Gent 38(3): 741-749; 1973.* (22 references)

The most important factor in the removal of fat-soluble drugs and pesticides from the body is their conversion to water-soluble compounds. Enzymes catalyze a variety of these changes. It is not sufficient to define a reaction mechanism from an examination of the chemical structure of parent compound and biotransformation product. Alternative mechanisms involving different enzymes have been found for the same overall reactions in several cases. The primary biotransformation reactions for the organophosphorous pesticides include three classes: reactions which leave the triester intact; removal of the carrier group, OX; or removal of R, dealkylation. It is essential to conduct metabolic studies in man, to ensure that he is not remarkably different from laboratory species and to characterize urinary metabolites which may be used to monitor recent exposure. Studies suggest that man does not have the high capacity for oxidative metabolism characteristic of laboratory animals. There are three classes of metabolites derived from organophosphates which reflect exposure in man. The monodealkylated insecticides and those derived from the carrier group, e.g., *p*-nitrophenol from parathion, are usually specific for a particular insecticide. Alternatively, the non-specific dialkyl phosphates are usually produced in good yield in urine and may be used as indicators. Studies indicate that the phosphorous triesters are as unstable in man as in experimental animals; thus it is unlikely that high levels of these pesticides or their metabolites can accumulate in humans.

75-0397. Van Dijck, P. J.; Van de Voorde, H.; Delmotte, J. (Laboratoire d'Hygiene Publique, Katholieke Universiteit, Louvain, Belgium). **Degradation biologique de l'insecticide DDT. [Biodegradation of the insecticide DDT.]** *Meded. Fac. Landbouwwetensch. Rijksuniv. Gent 38(3): 751-758; 1973.* (9 references) (French)

The effect of DDT on the soil microflora, and its biodegradation were studied in laboratory tests. The

minimum inhibitory concentrations of DDT were found to be 50 μg/ml for *Corynebacterium xerosis* NCTC 9755, *Staphylococcus aureus* ATCC 6538 P, and *Mycoplasma gallisepticum*; 50 μg/ml for *Bacillus cereus* NCTC 8035, *B. subtilis* NCTC 8234, *Bordetella bronchiseptica* NCTC 8344, *Candida albicans*, and *Streptomyces* species; and 1,000 μg/ml or higher for *Sarcina lutea* ATCC 9341, *Escherichia coli*, and *Mycobacterium tuberculosis* H37Rv. Thus, the DDT concentrations found in the water of the Nethe river and its tributaries are too low to interfere with the microflora. Of the many bacteria tested, only a species of the *Erwinia* genus was found to partially metabolize DDT to DDD (TDE) by dechlorination. Dechlorination was caused by fungi and *Streptomyces* as well, in a way apparently analogous to bacteria.

75-0398. Mirkhaitov, T.; Ikramov, L. T. (Tashkent Inst. Pharmacol., Tashkent, USSR). **Sokhranyayemost' fozalona i ftalofosa v biomateriale i raspredeleniye etikh veshchestv v organakh otravlennykh zhivotnykh. [Retention of phosalone and phthalophos in biomaterial and distribution of these substances in organs of poisoned animals.]** *Med. Zh. Uzb. 12: 14-18; 1973.* (Russian)

The persistence of phosalone and phthalophos (phosmet) in decaying putrid biological material, and the distribution of these substances in the organs of poisoned rabbits were studied. Following extraction with ether and clean-up on alumina column and silica gel layer, phosalone and phthalophos were detected by such reagents as silver nitrate, copper nitrate, mercury chloride, mercury bromide, iodine chloride, and Frede's solution. Phosalone was detected in decaying biological material for up to 40 days by the most sensitive reagents, such as silver nitrate and copper nitrate. Phthalophos was detected by all methods during the first 15 days and for up to 30 days by silver nitrate and mercury dibromide. Following administration of 1.5 g phosalone to rabbits through gastric tube, the phosalone residues were highest in the stomach, intestines, and liver. No phosalone was detected in the kidney, heart, lungs, and brain.

75-0399. Allazov, S. (Dept. Surgery, Samarkand Inst. Med., Samarkand, USSR). **Autoantitela k tkani shchitovidnoy zhelezy pri perelome i khronicheskom otravlenni butifosom. [Autoantibodies toward tissue of the thyroid gland after bone fracture and during chronic butiphos poisoning.]** *Med. Zh. Uzb. 12: 20-21; 1973.* (Russian)

The effect of bone fracture and chronic exposure to butiphos (DEF) and the of the two combination on the formation of autoantibodies toward thyroid gland tissue was studied in chinchilla rabbits. The rabbits were fed 1/50 LD50 doses of butiphos daily for 95 days, and the second metatarsal bone of their right hind foot was broken on the 7th day of the poisoning. Both fracture alone and fracture against the background of chronic poisoning by butiphos resulted in the formation of autoantibodies against the thyroid gland at a rate far exceeding the normal value. The maximum autoantibody titer was higher and appeared at an earlier date in butiphos-poisoned rabbits than in rabbits not poisoned, which is indicative of the injurious action of butiphos on the thyroid gland. The change induced by butiphos in the hormonopoietic function of the thyroid gland affected the redox processes which in turn slowed down the healing of the fracture.

75-0400. Tashkhodzhayev, P. I.; Nadzhimutdinov, K. N.; Sharipova, N. M. (Dept. Histol. Pharmacol., Tashkent Med. Inst., Tashkent, USSR). **Vliyaniye geksakhlortsiklogeksana (GKhTsG) na obshchuyu morfologiyu i ultrastrukturu pecheni v eksperimente. [Effect of hexachlorocyclohexane on the general morphology and ultrastructure of the liver.]** *Med. Zh. Uzb. 12: 23-27; 1973.* (Russian)

Histopathological changes in the liver due to hexachlorocyclohexane were studied by microscopic and electron microscopic techniques in male white rats following administration of 43 mg/kg doses (1/20 of LD50) for 6 days, or 17.4 mg/kg doses (1/50 LD50) for 4 months. Moderate venous stasis, isolated perivasular lympho-histiocytic infiltrations in the interlobular connective tissue, pronounced protein dystrophy with granules and eosinophilic inclusions in the cytoplasm, focal necrosis of the hepatocytes, fatty degeneration of the type of large drops, and also hypertrophic polynuclear hepatocytes with dense cytoplasm were found after poisoning for 6 days. Polymorphous mitochondria with slightly dense matrix, and frequent elongation of the cristae of the mitochondria were observed. Slight dilatation and plethora of the capillaries, moderate lymphohistiocytic infiltration of the interlobular connective tissue, rather uniform hepatocytes, slight reduction in the dystrophic changes of the cells, hypertrophy of many hepatocytes, and also cells with basophilic plasma and pycnotic nuclei were found after poisoning for 4 months.

75-0401. Zakirov, U. B.; Volokhvyanskiy, Ye. A.; Kadyrov, U. Z. (Dept. Pharmacology, Tashkent Inst. Med., Tashkent, USSR). **Vliyaniye maylkh doz geksakhlortsiklogeksana pri dlitel'nom vvedenii na aktivnost' fermentov tonkogo kishechnika. [Effect of small doses of hexachlorocyclohexane after a lengthy period of administration on the activity of small intestine enzymes.]** *Med. Zh. Uzb. 12: 28-31; 1973.* (Russian)

The effect of daily 3.54 mg/kg (1/50 of LD50) doses of lindane, adminstered through gastric tube, on the small intestine enzymes was studied in male and female white rats. The animals were sacrificed 0.5, 1, 2, and 4 months after the start of the experiment. An initial increase in the glycyl-valine dipeptidase activity

was determined on the 15th day of the experiment. Statistically significant increase in the glycyl-valine dipeptidase and invertase activities and in the weight of the intestinal mucosa, accounting for a significant increase in the monoglyceride lipase, glycyl-valine dipeptidase, invertase, and alkaline phosphatase reserves, were observed on the 30th day. Decreasing tendencies of the glycyl-valine dipeptidase, invertase, and alkaline phosphatase activities, as well as of the weight of the intestinal mucosa were evidenced after 2 months. The monoglyceride lipase reserve decreased significantly. Significant reduction of the glycyl-valine dipeptidase, invertase, alkaline phosphatase, and amylase activities, as well as of the weight of the intestinal mucosa was determined after 4 months.

75-0402. De Matteis, F. (Biochem. Mechanisms Sect., Med. Res. Council, Toxicol. Unit, Carshalton, Surrey, England). **Covalent binding of sulfur to microsomes and loss of cytochrome P-450 during the oxidative desulfuration of several chemicals.** *Mol. Pharmacol. 10(5): 849-854; 1974.* (10 references)

When liver microsomes from phenobarbitone-treated rats are incubated with carbon disulfide, a marked loss of cytochrome P-450 is observed when NADPH is present. By employing ^{14}C- and ^{35}S-labeled CS_2, it has been found that in the presence of NADPH, labeled sulfur becomes covalently bound to microsomes: The binding of ^{35}S exceeds that of ^{14}C, indicating that sulfur itself becomes bound. A loss of cytochrome P-450 is also seen when parathion, phenylthiourea, or 1-naphthylisothiocyanate is incubated with liver microsomes in the presence of NADPH, whereas the oxygen-containing analogues of these compounds are all inactive. It is concluded that reactive sulfur liberated during the oxidative desulfurization of several chemicals may become bound to cellular components and initiate toxic changes in the liver. This may account not only for the loss of cytochrome P-450 but also for the centrilobular hydropic degeneration seen in vivo. (Author abstract by permission of Academic Press)

75-0403. Vogel, E. (Central Lab. for Mutagenicity Studies, Freiburg, Germany). **Strain differences in *Drosophilia*: variation in sensitivity to mutation induction with methyl demeton and some other chemical mutagens.** *Mutat. Res. 21(4): 204; 1973.*

Ethyl methansulfonate and the indirect mutagens azoxymethane and 1-(2,4,6-trichlorophenyl)-3,3-dimethyltriazene were tested for mutagenicity in two *Drosophila* strains, Berlin K and Hikone R. Pronounced strain differences were obtained in the induction of X-chromosome recessive lethals in adult males. The action of the insecticide methyl demeton on both strains was tested. The Hikone R strain exhibited a slight increase in mutation frequency above the control level at concentrations of 1.5 m*M* and 3.0 m*M* methyl demeton. Negative results were obtained on the Berlin K strain, because the highest concentration that could be applied was 0.043 m*M*.

75-0404. Benezet, H. J.; Matsumura, F. (Dept. Entomol., Univ. Wisconsin, Madison, WI 53706). **Isomerization of γ-BHC to α-BHC in the environment.** *Nature (London) 243(5408): 480-481; 1973.* (10 references)

To study the metabolic fate of γ-BHC in the environment, highly purified γ-BHC was incubated with aquatic sediments (taken from Pearl Harbor, Hawaii) under simulated natural conditions and with a soil microorganism (*Psuedomonas putida*) under laboratory conditions. The nonradioactive γ-BHC used contained 0.0017% of impurity as α-BHC. Incubation of γ-BHC with aquatic sediments for 30 days resulted in a 4-fold increase in the content of α-BHC in the sample. The large scale incubation of γ-BHC with *P. putida* yielded a 40-fold increase in α-BHC. On a smaller scale, *P. putida* normally produced γ-PCCH (γ-pentachlorocyclohex-1-ene) from γ-BHC, but was able to produce α-BHC on incubation with NAD. Another principal metabolic product was γ-BTC (γ-tetrachlorocyclohex-1-ene).

75-0405. Edwards, C. A.; Jeffs, K. (Rothamsted Experimental Station, Hertforshire, England). **Rate of uptake of DDT from soil by earthworms.** *Nature (London) 247(5437): 157-158; 1974.* (10 references)

Uptake of DDT into earthworms was followed in twelve culture boxes (450 mm high x 180 mm wide x 90 mm deep) containing 10 healthy *Lumbricus terrestris* and soil treated with DDT to give an approximate concentration of 1 ppm. Earthworms which had spent their entire life span in DDT contaminated soil were also studied. In the uptake experiment, worms accumulated the maximum amount of DDT residues from soil after about 1 month. There appeared to be 3 phases, an initial fairly rapid uptake, followed by some loss, then a further uptake before equilibrium was reached. Perhaps the initial rapid uptake is due to ingestion whereas the slower phase represents redistribution of residues within the organism. Conversion of DDT to DDT derivatives continued. In worms taken from the field, DDE contents were much higher, indicating that the metabolizing process does not stop. When worms which had lived continuously in DDT contaminated soils were placed in untreated soil they excreted DDT more rapidly, but some DDT derivatives remained in their tissues for several months. The presence of DDE in worms indicates that this species contributes significantly to the initial degradation of DDT, as the amount of DDT converted to DDE in soil itself is small.

75-0406. Sato, K.; Yagawa, K.; Nishio, Y. (School of Pathol., Faculty of Med., Iwate Med. College, Morioka, Japan). **[Morphological study of the thyroid gland of**

mouse given 3-amino-1,2,4-triazole and/or propylthiouracil for long periods.] *Nippon Byorigakkai Kaishi (Trans. Soc. Pathol. Jap.) 63: 185; 1974.* (Japanese)

Two groups of DDN female mice, consisting of 34 (I) and 33 (II) individuals given water containing 2000 ppm of 2-amino-1,2,4-triazole (amitrole, AT) ad lib were fed either a diet containing 0.2% of propylthiouracil (I) or an ordinary diet (II) for 400 days. Histological and electron microscopic examinations of the survivors. 5 (I) and 7 (II) mice, showed conspicuous formation of goiter with proliferation of irregularly sized folicles and with reduced colloids. Especially in group I, tendencies of nuclear swelling, rectangular and cylindrical swelling, and papillous proliferation of follicular cells were found, with slight cellular infiltration of stroma, eroded capsules, and invasion of veins. In group II, interfollicular hemorrhage, stromatal edema, and venous dilatation were seen, with eroded capsules and invasion of veins in some animals. Electron microscopic findings were also indicative of goitrous alteration. Because of the greater tendency to atypia of follicular cells in group I than in group II, it was considered that the addition of PTU aggravated the tumorous alteration caused by AT. 3-Amino-1,2,4-triazole has been registered as a herbicide and is known to cause goiter in animals. (Lecture presented at LXIII Annu. Meeting, Soc. Pathol. Jap., April 3-5, 1974, Nagoya, Japan)

75-0407. Tsuda, H.; Hirose, M.; Fukushima, A.; Takahashi, M. (First Sch. Pathol., Fac. Med., Nagoya Munic. Univ., Nagoya, Japan). **Changes in the thyroid gland of rats given 3-amino-1,2,4-triazole. Part 2. Changes following long-term administration.** *Nippon Byorigakkai Kaishi (Trans. Soc. Pathol. Jap.) 63: 186; 1974.* (Japanese)

Female Wistar rats were supplied ad lib with water containing 2500 or 5000 ppm of 3-amino-1,2,4-triazole (amitrole, AT); 2500 ppm AT with triiodothyronine at 1 μg/kg/day; or 5000 ppm AT plus triiodothyronine at 1 μg/kg/day. After more than 16 weeks on these regimens, the numbers of surviving rats in the respective groups were 67/337, 17/40, 11/15, and 9/15. Two of the ten rats in the control group also died. The thyroid glands of the surviving animals were examined histologically. The thyroid glands of all the treated animals were severely swollen, with proliferated, smaller-sized, and irregular-sized follicles practically lacking in colloids. The follicular epithelium had grown in papilla-like fashion into the follicular cavity with its thin stroma. Smaller follicular tissue repeatedly penetrated through the capsule into the surrounding tissues. Follicular tissue invaded the blood vessels, and adenoma-like nodes of cuboidal epithelium were present, showing papillar or solid atypical proliferation. Atypical proliferation of the intrahepatic bile duct was found in one amitrole-treated rat. Several cases of atypical proliferation of intrahepatic bile duct were found in rats in other series of experiments with AT administration. These changes were interpreted as indicating thyroid tumorigenicity of AT in long-term administration to rats. (Lecture presented at the 63rd annual Meeting of the Japanese Society of Pathology, Nagoya, Japan, April 3-5, 1974.)

75-0408. Muscarella, A.; Galofaro, V. (Ist. Patol. Gen. Anat. Patol. Vet., Univ. Studi Messina, Messina, Italy). **Lesioni anatomo-patologiche provocate dal paraquat su alcuni pesci di acqua dolce. [Anatomical lesions caused by paraquat in some fresh-water fish.]** *Nuova Vet. 49(4): 211-221; 1973.* (10 references) (Italian)

Anatomical lesions caused by short-term exposure to fresh water containing 250 ppm paraquat were studied in *Tinca tinca, Carassius carassius*, and *Cobitis taenia*. While certain specimens of *T. tinca* were found dead after 12 hours of exposure, all other specimens survived the first 24 hours. An opaque, filamentous cover was seen on the skin. Histological examination revealed lymphocyte infiltration, elongation and focal accumulation of chromatophores, loss of epithelium on the skin and gills as well as on the sensory papillae, edema of the muscles, complete necrosis of the intestinal mucosa with hemoglobin crystals in the vessels, and presence of hyaline membrane in the liver. Due to the loss of the epithelium, the fish were especially susceptible to attack by parasites and microbes.

75-0409 Cook, T. F. (Min. Agr. and Fish., Palmerston North, New Zealand). **The efficiency of a mixture of haloxon and trichlorfon against strongyles and bots in horses.** *N. Z. Vet. J. 21(8):157-159; 1973.* (7 references)

One mixture of haloxon at 60 mg/kg plus trichlorfon at 20 mg/kg and a second mixture of haloxon at 60 mg/kg plus trichlorfon at 10 mg/kg were tested for effectiveness against strongyles and bots in horses. The mixture with trichlorfon at 20 mg/kg was 100% effective against 2nd and 3rd stage *Gasterophilus* larvae, *S. vulgaris*, and *Triodontophorus*, 70 to 83% effective against *Trichonema* spp., and variable against *Strongylus edentatus*. Further study of the variable effectiveness recorded against *Strongylus edentatus* indicated that the male of the species was much more susceptible to haloxon than the female. Therefore, the efficiency of the mixture was determined by the relative percentage of male to female of the species in the horse at the time of dosing. The mixture was much less effective when the dose of trichlorfon was lowered to 10 mg/kg. No signs of toxicity to the horses were noted with either dose level. Examination for nematodes was made to be certain the anthelmintic activity was not impaired by mixing the drugs.

75-0410. Civen, M.; Brown, C. B. (Med. Res. Programs, VA Hosp., Long Beach, CA). **The effect of organophosphate insecticides on adrenal corticosterone formation.** *Pestic. Biochem. Physiol. 4(3):254-259; 1974.* (21 references)

To determine whether the depression in corticosteroidogenesis produced by exposure to organophosphate insecticides could be due to a direct interaction between the insecticide and the adrenal gland, dichlorvos, dursban, and diazinon were added directly to adrenal cells obtained from male Sprague-Dawley rats and the effects on steroidogenesis were observed. In an *in vivo* experiment, rats were injected i.p. with 20 mg/kg of dichlorvos. All three organophosphate insecticides depressed endogenous corticosterone synthesis and blocked corticosteroidogenesis in response to stimulation of the adrenal cells with ACTH or cAMP. Pregnenolone stimulation of the adrenal cells was not inhibited by insecticide concentrations which blocked the ACTH and cAMP stimulation of corticosteroidogenesis. The insecticides probably acted beyond the site of action of ACTH, at or beyond the level of cAMP metabolism, and prior to the metabolism of pregnenolone.

75-0411. Uchida, M.; Kurihara, N.; Fujita, T.; Nakajima, M. (Dept. Agr. Chem., Kyoto Univ., Kyoto, Japan). **Inhibitory effects of BHC isomers on Na^+-K^+-ATPase, yeast growth, and nerve conduction.** *Pestic. Biochem. Physiol. 4(3):260-265; 1974.* (21 references)

The biological effects of benzene hexachloride (BHC) isomers on beef brain Na^+-K^+-ATPase, yeast growth, and nerve conduction in the cockroach were studied. The results were compared with those obtained using aliphatic alcohols, menthol, and thymol. δ-BHC was more active than the γ-isomer (lindane) in inhibiting beef cerebral Na^+-K^+-ATPase, yeast growth, and conduction in cockroach nerve cords; the precise inhibitory concentrations of the α- and β-isomers could not be determined. Only the γ-isomer appeared to have a dual effect on the cockroach nerve: depression at higher concentrations and excitation at lower concentrations. The aliphatic alcohols, menthol, and thymol also inhibited the same biological systems, the inhibitory activity of the former increasing with chain length. Each type of biological activity shown by the BHC isomers correlated well with the physicochemical properties of the test compounds (e.g., hydrophobicity). The insecticidal action of γ-BHC showed little correlation with its inhibitory effect on Na^+-K^+-ATPase or nerve conduction.

75-0412. Whitten, C. J.; Bull, D. L. (Cotton Insects Res. Lab., Agr. Res. Serv., College Station, TX 777840). **Comparative toxicity, absorption, and metabolism of chlorpyrifos and its dimethyl homologue in methyl parathion-resistant and -susceptible tobacco budworms.** *Pestic. Biochem. Physiol. 4(3):266-274; 1974.* (21 references)

Chlorpyrifos (Dowco 179) and its dimethyl homologue, chlorpyrifosmethyl (Dowco 214) were used to study the influence of the *O,O*-dialkyl group of organophosphorus insecticides on toxicity, absorption, and metabolism among methyl parathion-resistant (R) and susceptible (S) strains of tobacco budworm (*Heliothis virescens* (F.)) larvae. Chlorpyrifos and chlorpyifosmethyl were more toxic than methyl parathion to 3rd-stage R larvae, but less toxic to S larvae. Chlorpyrifosmethyl was more toxic than chlorpyrifos to both strains. The results of the absorption studies indicated that the toxicity differential of the homologues is explainable in part by the more rapid absorption of the dimethyl form. Both compounds were degraded mainly by cleavage of the pyridylphosphate linkage. *In vitro* tests demonstrated that the NADPH-dependent microsomal oxidases were of primary importance in detoxification, while glutathione (GSH)-dependent mechanisms (aryl- and alkyltransferases) present in the soluble cell fractions were of lesser importance. *O*-dealkylation occurred only with chlorpyrifosmethyl. The R larvae demonstrated a greater capacity for detoxifying both compounds *in vitro* and *in vivo* the differences being more apparent during the 5th instar than during the 3rd instar.

75-0413. Akkermans, L. M. A.; van den Bercken, J.; van der Zalm, J. M.; van Straaten, H. W. M. (Inst. Vet. Pharmacol. Toxicol., Univ. Utrecht, Utrecht, The Netherlands). **Effects of dieldrin (HEOD) and some of its metabolites on synaptic transmission in the frog motor end-plate.** *Pestic. Biochem. Physiol. 4(3):313-324; 1974.* (39 references)

Intracellular electrodes were used to study the effects of dieldrin and some of its metabolites on synaptic transmission in the frog (*Rana esculenta, Rana temporaria*, and *Rana pipiens*) motor end-plate. Dieldrin, 9-*syn*-hydroxy-dieldrin, and the aldrin-derived dicarboxylic acid had no significant effects on the frequency or amplitude of the miniature end-plate potentials or on the end-plate membrane potential. Aldrin-transdiol caused a rapid and marked increase in miniature end-plate potential frequency, along with a decrease in amplitude. The spontaneous transmitter release was probably enhanced by two prejunctional mechanisms: a calcium-dependent effect, probably a depolarization of the nerve terminal, and a calcium-independent action. Aldrin-transdiol also reduced the amount of transmitter released in response to a high external potassium concentration, and caused a marked increase in the end-plate potential, followed by a decrease, and finally by a complete blockade of neuromuscular transmission. This transient increase in transmitter release was due to a transient increase in quantal content. The subsequent fall in end-plate amplitude and the fall in miniature end-plate potential amplitude were probably the result of a reduction in the sensitivity of the postsynaptic membrane to acetylcholine. Aldrin-transdiol had no effect on the end-plate membrane potential. The data supports the hypothesis that dieldrin must be converted to aldrin-transdiol before it can exert its neurotoxic effect.

75-0414. Smith, B. R.; Dauterman, W. C.; Hodgson, E. (Dept. Entomol., North Carolina State Univ., Raleigh, NC 27607). **Selective inhibition of the metabolism of diazinon and diazoxon in vitro by piperonyl butoxide, NIA 16824, and 1-(2-isopropylphenyl)imidazole.** *Pestic. Biochem. Physiol. 4(3):337-345; 1974.* (35 references)

Several pesticide synergists known to be mixed-function oxidase inhibitors inhibited the *in vitro* metabolism of diazinon by mouse liver microsomes. Piperonyl butoxide and NIA 16824 (*O*-isobutyl-*O*-propargyl phenylphosphonate) inhibited all oxidative reactions of diazinon to the same extent. In contrast, 1-(2-isopropylphenyl)-imidazole selectively inhibited oxidative dearylation and thiophosphate-to-phosphate conversion without significant effect on ring side chain hydroxylation. This selectively suggests that two different mechanisms of oxidative detoxification may be in operation; these mechanisms may involve either two cytochrome P-450s or two different binding sites on the same cytochrome.

75-0415. Dekhuijzen, H. M.; Vonk, C. R. (Inst. Org. Chem. T.N.O., Utrecht, The Netherlands). **The distribution and degradation of chlormequat in wheat plants.** *Pestic. Biochem. Physiol. 4(3):346-355; 1974.* (27 references)

The distribution and degradation of chlormequat chloride in summer wheat was determined after uptake of the compound by the roots of summer wheat seedlings. The plant regulator was readily translocated from the roots to the above ground parts and converted into choline. The choline was further metabolized to betaine, which, upon demethylation, finally yielded glycine and serine. Both amino acids were incorporated into a protein fraction. The occurrence of radioactively labeled glycine and serine in the amino acid pool and the evolution of $^{14}CO_2$ from chlormequat treated plants indicated that serine was formed from glycine under the release of $^{14}CO_2$ during photorespiration. One week after the uptake period, 82% of the ^{14}C chlormequat taken up by the roots was recovered as the parent compound or as breakdown products in the wheat plants. In addition, 5% of the original amount taken up by the roots was released as $^{14}CO_2$ by the leaves. Fifty percent of the total amount of chlormequat originally present in the roots and leaves was already metabolized after 7.5 days. No evidence was obtained for the presence of unchanged chlormequat or an unknown metabolite in the nucleic acid or protein fractions.

75-0416. Baldwin, M. K.; Porter, A.; Hayes, W. P.; Burns, D. T. (Shell Res. Ltd., Sittingbourne, Kent, England). **Synthesis and structural studies of 9-*anti*-hydroxy HEOD.** *Pestic. Sci. 5(1): 121-134; 1974.* (18 references)

9-*Syn*-hydroxy HEOD, a major mammalian metabolite of HEOD, was oxidized to the ketone which, on reduction with sodium borohydride, gave a product identified by spectrometric methods as 9-*anti*-hydroxy HEOD. This product was not converted to the pentachloroketone metabolite of HEOD, either by photolysis or metabolically by a rat. (Author abstract by permission)

75-0417. Walker, A. I. T.; Brown, V. K. H.; Kodama, J. K.; Thorpe, E.; Wilson, A. B. (Shell Res. Ltd., Tunstall Lab., Sittingbourne, Kent, England). **Toxicological studies with the 1,3,5-triazine herbicide cyanazine.** *Pestic. Sci. 5(2): 153-159; 1974.* (19 references)

Acute and long-term mammalian toxicity studies were carried out with the 1,3,5-triazine herbicide cyanazine (I) and its two major plant and soil metabolites DW 4385 (II) and DW 4394 (III). Depending upon the species used, the acute oral LD50 values for cyanazine ranged from 140–750 mg/kg, the values in any one species not being influenced by formulation. The acute, percutaneous LD50 values were greater than 1000 mg/kg, the maximum dose which could be administered. Cyanazine was non-irritant to eyes and skin and a non-sensitizer to skin. The acute oral LD50 in rats for (II) was 789 mg/kg and for (III) was $>$ 2000 mg/kg. In 13-week studies on cyanazine, reduced growth rates and organ weight changes were the most sensitive criteria of exposure, 25 parts/million in the diet of rats and 5 mg/kg orally dosed to dogs being considered to be without toxicological effect. In two year studies 12 parts/million in the diet of rats and 1.25 mg/kg orally dosed to dogs produced no changes of toxicological significance. In 13-week studies with (II) and (III), intakes of up to 10,000 parts/million in the diet failed to produce any toxicologically significant changes. (Author abstract by permission)

75-0418. Devonshire, A. L.; Needham, P. H. (Rothamstead Exper. Sta., Harpenden, Herts., England). **The fate of some organophosphorus compounds applied topically to peach-potato aphids (*Myzus persicae* (Sulz.)) resistant and susceptible to insecticides.** *Pestic. Sci. 5(2): 161-169; 1974.* (10 references)

The fate of [^{14}C]-dimethoate and [^{14}C]-parathion after topical application to strains of *Myzus persicae* resistant and susceptible to organophosphorus compounds was investigated. In 4 hr approximately 65% of the dimethoate or parathion applied was lost from the aphids by evaporation, and this limited the amount available for penetration into the insect. Only approximately 25% of the dose applied penetrated, of which a very small proportion was excreted as metabolites. There was no difference in the amounts penetrating into the resistant and susceptible strains, indicating that penetration was not a factor contributing to the observed resistance. These findings emphasize that evaporation from the cuticle can greatly influence results when insecticides are applied topically. (Author abstract by permission)

75-0419. Stringer, A.; Lyons, C. H. (Long Ashton Res. Sta., Univ. of Bristol, BS18 AF, England). **The effect of benomyl and thiophanate-methyl on earthworm populations in apple orchards.** *Pestic. Sci. 5(2): 189-195; 1974.* (17 references)

The use of the fungicides benomyl and thiophanate-methyl on experimental orchard plots for 3 years and of benomyl on a commercial orchard for 1 year resulted in a drastic reduction of earthworm populations. The species of earthworms affected were *Lumbricus terrestris, L. castaneus, L. festivus, L. rubellus, Allolobophora caliginosa, A. chlorotica, A. longa, A. rosea, A. tuberculata* and *Octolasium cyaneum. L. terrestris* and *A. chlorotica* were more affected than the other species, both being virtually eliminated after 2 years' spraying. The depleted populations of species other than *L. terrestris* and *A. chlorotica* recovered to normal levels after a 2-year rest period following a single year's treatment with benomyl (1.40 kg/ha). The role of the surface-feeding *L. terrestris* is discussed in relation to the spray fall-out on the sward and to grass management. (Author abstract by permission)

75-0420. Krupka, R. M. (Res. Inst., Res. Br., Agr. Canada. London, Ontario N6A 3KO, Canada). **On the anti-cholinesterase activity of benomyl.** *Pestic. Sci. 5(2): 211-216; 1974.* (5 references)

The fungicide benomyl, previously reported to be an anti-cholinesterase and toxic to earthworms, has now been shown to have little or no effect on cholinesterase. However, it breaks down to form two products: butyl isocyanate, which is an irreversible inhibitor of the enzyme of comparable potency to organophosphates; and methyl benzimidazol-2-ylcarbamate (MBC, carbendazim), which does not inhibit at all. The reported inhibitory power of benomyl is therefore likely to be due to formation of small quantities of the former. It is also concluded that toxicity of benomyl and MBC to earthworms cannot be due to inactivation of cholinesterase. (Author abstract by permission)

75-0421. Feung, C. S.; Mumma, R. O.; Hamilton, R. H. (Dept. Entomol., Pennsylvania State Univ., University Park, PA 16802). **Metabolism of 2,4-dichlorophenoxyacetic acid in several plant tissue cultures.** *Plant Physiol. Suppl. 41; 1974.*

Investigations have demonstrated that soybean cotyledon callus tissue cultures readily metabolize 2,4-D to seven amino acid conjugates (Ala, Val, Leu, Asp, Glu, Phe and Try) and glucosides of two ring hydroxylated metabolites, 4-hydroxy-2,3-dichlorophenoxyacetic acid and 4-hydroxy-2,5-dichlorophenoxyacetic acid. The amino acid conjugates were still active in stimulating plant cell elongation and division, but the two hydroxylated metabolites were inactive. The metabolism of 2,4-D has been studied in carrot, jackbean, sunflower, and corn endosperm callus tissue cultures. Results show that all callus tissues examined possess the ability to metabolize 2,4-D to amino acid conjugates and to ring hydroxylated compounds. Two additional hydroxylated metabolites in corn endosperm tissue are tentatively identified as 4-hydroxy-2-chlorophenoxyacetic acid and 3-hydroxy-2,4-dichlorophenoxyacetic acid (biologically active).

75-0422. Zimakowska, D. (Dept. Bioenergetics and Bioproductivity, Nencki Inst. Exp. Biol., Warsaw, Poland). **Effects of 2,4-D-Na of various concentrations on respiration of an aquatic crustacean *Asellus aquaticus* L.** *Pol. Arch. Hydrobiol. 20(3):469-473; 1973.* (11 references)

The effects of 2,4-D, sodium salt (1.25, 2.50, 5.00 and 7.50 mM) on oxygen consumption in *Asellus aquaticus* are significant. All concentrations used produced visible effects. Oxygen consumption was similar in animals exposed to concentrations of 1.25 and 2.50 m*M*, and amounted to about 115% that of controls. As animals were kept longer in the herbicide, their oxygen consumption increased and amounted to 0.45 μl/hr/mg. At the 5.00 m*M* concentration oxygen consumption rapidly increased and after 24 hr it measured 0.54 μg/hr/mg, 142.1% that of control. At the 7.50 m*M* concentration animal mortality was 75% and oxygen consumption by those which survived rapidly decreased to 0.32 μl/hr/mg after 6 hr and to 0.26 μl/hr/mg after 24 hr. The high oxygen consumption at the 5.00 m*M* concentration suggests that oxidative phosphorylation was uncoupled. The herbicide 2,4-D-Na exerts its influence on the respiratory cycle by disrupting oxidative phosphorylation as well as by disturbing the connections between electron transport and phosphorylation. This concentration seems to be the critical one for *Asellus aquaticus*.

75-0423. Krampl, V.; Vladar, M. (Nat. Inst. Hyg., Bratislava, Czechoslovakia). **Ucinok kombinacie insekticidu heptachlor s fenobarbitalom na aktivitu niektorych mikrozomalych enzymov v peceni bielych potkanov. [The effects of a combination of the insecticide heptachlor and phenobarbital on the activity of some enzymes in the livers of white rats.]** *Prac. Lek. 25(8): 324-6; 1973.* (11 references) (Slovak)

Heptachlor (80 or 160 mg/kg) was dissolved in oil and administered to male white Wistar rats, followed by intraperitoneal injection of phenobarbital (60 or 120 mg/kg). The activity of the hepatic microsomal enzymes which catalyze the oxidative detoxication of the *O*-ethyl-*O*-*p*-nitrophenyl ester of phenylthiophosphoric acid (EPN) and the *O*-demethylation of *p*-nitroanisole was determined 24 hours later. The results indicate that the combination of the two inducers failed to produce significant stimulation of the activity of the detoxifying microsomal enzymes; at the higher phenobarbital level, the activity was actually decreased.

75-0424. Earl, J. W. (Dept. Agr. Chem., Univ. Sydney, Sydney, Australia). **Electron transport for aldrin epoxidation in peas (*Pisum sativum*).** *Proc. Aust. Biochem. Soc. 6:48; 1973.* (3 references)

The particulate system which epoxidizes aldrin to dieldrin in plant roots is similar to microsomal mixed-function oxidases of animals in its requirement for NADPH and oxygen and in exhibiting some inductive effects. Rapid gel filtration of pea root homogenates under a nitrogen atmosphere increased epoxidation by removing low molecular weight, heat-stable inhibitors, presumed to be quinones. An antimycin insensitive NADPH-cytochrome c oxidoreductase occurring mainly in the soluble fraction competed with epoxidation for electrons. Both benzoquinone and naphthoquinone also inhibited epoxidation. Mammalian NADPH-cytochrome c oxidoreductase can transfer electrons from NADPH to 1,4-naphthoquinones but not to other quinones. Epoxidation was enhanced by α,α'-dipyridyl and 1,10-phenanthroline which may reduce diversion of electrons to other processes. Treatment of the particles with detergents or lipase also increased epoxidation. Relations between electron transport systems, both membrane-bound and soluble, and the particulate epoxidase are also discussed.

75-0425. Ruppel, R. F.; Laughlin, C. W.; Fogg, R. (Michigan State Univ., East Lansing, MI 48823). **Toxicities of some insecticides to earthworms.** *Proc. N. Cent. Br. Entomol. Soc. Amer. 28: 189; 1973.*

Prophos, aldicarb, carbofuran, and Tirpate caused high mortalities (2,4-dimethyl-1,3-dithiolane-2-carboxaldehyde *O*-(methylcarbamoyl) oxime to earthworms (principally night-crawlers, *Lumbricus terrestris* L.) when applied as pre-plant or planting time soil applications in sugarbeets. CL 921000, CL 64475, Nemacur, and chlorpyrifos caused minor or no mortality to earthworms when similarly applied. Earthworm mortality with aldicarb increased directly with increased band width. The 85% fiducial limits for LD50 to night-crawlers (as lb AI per broadcast A) in laboratory studies are: prophos 3.73 - 5.64; aldicarb 5.05 - 6.46; carbofuran 5.63–11.49; Tirpate 7.08 - 8.03, and greater than 32 with chlorpyrifos, CL 92100, and Nemacur.

75-0426. Larsen, K. D.; Jalal, S. M. (Dept. Biol., Univ. North Dakota, Grand Forks, ND). **DDT induced mutations in mice.** *Proc. N. Dak. Acad. Sci. 27(1):18; 1973.*

Twenty-four brown and Balb/c strain albino mice were injected with DDT in peanut oil (25, 50, 100, or 250 ppm/kg, i.p.). Controls received either no injection or peanut oil alone. Karyotypes from bone marrow cells of long bones were analyzed for gaps, deletions, and stickiness. Data for chromosome aberrations was taken from 200 cells/animal, and mitotic indices were calculated from 1000 cells/animal. ANOVA and Dunnett's multiple comparisons test were used to test the effect of DDT treatment. Gaps, stickiness, and mitotic indices were not significantly affected. Deletions and gaps plus deletions were significantly in excess of controls in treatment groups with 50 ppm and higher concentrations. DDT appears to be a potential mutagen in concentrations found in secondary consumers.

75-0427. Sifri, M.; Sell, J. L.; Davison, K. L. (Anim. Sci. Dept., North Dakota State Univ., Fargo, ND 58102). **Comparative effect of *p,p'*-DDT on hepatic microsomal enzymes in young quail, chicks and ducklings.** *Proc. N. Dak. Acad. Sci. 27(1): 33; 1973.*

Separate experiments of two weeks duration were conducted with 1 week old Japanese quail, white leghorn chicks, and mallard ducklings. Treatments included: control diet, control diet + 100 ppm *p,p'*-DDT, control diet + pentobarbital (25 mg/kg i.p., daily), or control diet + DDT + pentobarbital. The specific activities of microsomal aniline hydroxylase and aminopyrine *N*-demethylase and the concentration of P450 were much higher in chicks compared with quail and ducklings. Dietary DDT induced these mixed function oxidases in ducklings while in chicks no significant changes were observed. Aniline hydroxylase and *N*-demethylase activities of quail treated with DDT were 40 and 70% of the controls, respectively. *In vitro* addition of *p,p'*-DDT (0, 10^{-7}, 10^{-5}, 10^{-3}M) to the incubation mixtures decreased aniline hydroxylase activities in chicks and quail (relative activities in percent: 100, 70, 55, 53 in quail and 100, 95, 71, 67 in chicks), while there was no effect in ducklings. It seems there are genuine differences among species of the *Aves* class concerning *p,p'*-DDT metabolism.

75-0428. Montgomery, J. A.; Struck, R. F. (Kettering-Meyer Lab., Southern Res. Inst., Birmingham, AL 35205). **The relationship of the metabolism of anticancer agents to their activity.** *Fortschr. Arzneimittelforsch. (Progr. Drug Res.) 17:32-304; 1973.* (794 references)

About 25% objective remission in tumors of the adrenal cortex has been achieved through use of *o,p'*-DDD (TDE). No *in vivo* activation of this agent has as yet been reported. The compound is apparently an inhibitor of biosynthesis of corticosteroids. A significant decrease in *in vitro* production of *N*-hydroxycorticosteroids by adrenal sections from dogs given the drug has been described. Levels of 11- and 17-hydroxycorticosteroids in adrenal venous blood from dogs given the pesticide decreased to 1-2% of normal levels. The drug also decreased hydrocortisone content in patients with Itsenko-Cushing's disease. An apparent inhibition of hepatic, pentobarbital-metabolizing enzymes was reported in mice and guinea pigs.

75-0429. Piechocka, J. (Dept. Food Produce Invest., State Inst. Hyg., Warsaw, Poland). **Badania kumulacji karbarylu. [Studies on carbaryl accumulation.]** *Roczn. Panstw. Zakl. Hig. 25(4):447-453; 1974.* (17 references) (Polish)

Two groups of 10 hens each (1.5 - 1.85 kg) were fed a diet containing either 15mg/kg (group IA) or 1500 mg/kg (group IIA) of carbaryl. After 30 days 5 hens of each group were sacrificed and dietary carbaryl content of remaining hens of group I increased to 150mg/kg (group IB), and of group II to 7,500 mg/kg (group IB), for an additional period of 30 days. Four hens served as control for each group. The level of carbaryl residue was determined in tissue and eggs by chromatography. Amounts of 0.05-0.1 mg/kg were detected in tissues of 3 out of 5 hens in group IIA and 0.05-0.2 mg/kg in 3 out of 5 in group IIB, indicating that no significant accumulation of carbaryl occurred under these experimental conditions.

75-0430. Szulinski, S. (Dept. Munic. Hyg., State Inst. Hyg., Warsaw, Poland). **Wplyw pestycydow fosfoorganiczych (malathion) na wyzsze czynnosci nerwowe szczurow badanych w komorze z electronicznym wyposazeniem sterujacym. [The effect of malathion on higher nervous functions of rats tested in a chamber with an electronic monitoring device.]** *Roczn. Panstw. Zakl. Hig. 25(4):473-483; 1974.* (27 references) (Polish)

Malathion (either 95% or Sadophos liquid 30%) was administered daily, by gastric tube, in amounts of 1.2, 12.0 or 120 mg/kg (corresonding to 0.001, 0.01 and 0.1 LD50 respectively) to groups of 10 week old Wistar rats. The animals were studied in 2 types of specially designed chambers, A and B. In chamber A, which permitted the development of a typical avoidance reaction and instrument-conditioned discrimination reaction, rats were investigated after 8 months of intoxication during an additional 3-month period of poisoning. Rats receiving 120 mg/kg were studied without preceding 8 months of poisoning. Chamber B was equipped with 8 photocells and an electronic signaling-monitoring device. In this chamber the differentiation of visual stimuli and change of conditioned reaction (re-learning) after reversal of visual stimuli was investigated during 10 months of chronic intoxication after an initial 3-month intoxication period. Results were statistically analyzed and indicated a marked impairment of higher nervous function in rats receiving 1.2 and 120 mg/kg. Rats receiving 12 mg/kg showed a markedly accelerated change of conditioned reactions after reversal of stimuli indicating an increase in efficiency of the central nervous system. Determination of whole blood acetylcholinesterase activity at 3 and 8 months of intoxication revealed a dose dependent inhibition of 4, 14 and 27% after 3 months and 37.43 and 60% after 8 months. The relationship of acetylcholinesterase level in brain to stimulation or retardation of conditioned reactions is briefly discussed. It is also concluded that the maximal dose which causes no changes in the central nervous system during chronic intoxication with malathion is less than 1.2 mg/kg.

75-0431. Tomita, K.; Takahi, Y.; Ishizuka, R.; Kamimura, S.; Nakagawa, M.; Ando, M.; Nakanishi, T.; Nakamura, T.; Okudaira, H. (Sankyo Res. Lab., Tokyo, Japan). **Hymexazol, a new plant protecting agent.** *Sankyo Kenkyusho Nenpo (Annu. Rep. Sankyo Res. Lab.) 25:1-51; 1973.* (47 references)

The synthesis, physical and chemical properties of hymexazol (3-hydroxy-5-methylisoxazole, Tachigaren) and related compounds are presented. Included in the review is a discussion of the antimicrobial activity including the controlling effect of 3-hydroxyisoxazoles as soil fungicides in relation to the chemical structure and the effect of hymexazol against many soil-borne plant diseases such as fusarium wilt of tomatoes, fusarium damping-off of rice seedlings, and damping-off of sugar beets. Characteristics of hymexazol as a soil fungicide are presented including its *in vitro* antimicrobial activity (the minimum inhibitory concentration on PSA medium, and the inhibiting effect on the mycelial growth of fungi in soil); the residual activity of hymexazol, its penetration ability, adsorption, phytotoxicity; and its growth regulating activity. The metabolism of the compound in plants is discussed, including uptake, translocation and movement, as well as the biological activities of its metabolites. Metabolism in rats is presented including excretion and distribution. Metabolism in soils and residues in plants are examined. Tests for acute toxicity, subacute toxicity (5 week and 3 month studies), mutagenicity, and toxicity to aquatic animals have been performed.

75-0432. Miyasaka, H. (Plant Protect. Div., Bur. Agr., Hort., Sericult., Min. Agr. Forest, Tokyo, Japan). **[Newly registered pesticides.]** *Shokubutsu Boeki (Plant Protect.) 28(10): 413; 1974.* (Japanese)

Introduced herein are a new insecticide (DCV WP) and a new fungicide (Probenazole Granules). DCV WP is a whitish powder containing 0.0028% (10000 DCV unit/g) of *Dendrolimus spectabilis* cytoplasmic polyhedral virus (DCV) as the active ingredient for controlling the host. Acute oral toxicity to experimental animals was negligible at the maximum dose of 3,200 mg/kg, and no effect was found on animals given 200 mg of DCV/kg daily for 90 days. All young carp tested survived for 48 hr in dilutions of the WP formulation at 10-50 ppm. Probenazole granules contain 8% of 3-allyloxy-1,2-benzoisothiazole-1,1-dioxide as the a.i. and are effective against *Pyricularia oryzae*. The acute toxicity LD50 p.o. is 2,750 mg/kg to male mouse, 2,220 mg/kg to female mouse, 2,160 mg/kg to male rat, and greater than 2,310 mg/kg to female rat. The tlm (48 hr) to young carp is 6.3 ppm.

75-0433. Oshiba, K.; Fujita, T. (Osaka Munic. Inst. Hyg., Osaka, Japan). **[Interaction between toxicant and nutrition, part 7. Effects of dietary protein levels on the β-BHC deposition in dam and offspring of rats during gestation and lactation.]** *Shokuhin Eiseigaku Zasshi (J. Food Hyg. Soc. Jap.) 15(5): 342-348; 1974.* (9 references) (Japanese)

Pregnant rats were fed diets containing β-BHC and ^{14}C-β-BHC, respectively, at 10 ppm and 5 μCi/10 g. The rats were sacrified and the residues of β-BHC in natural organs and tissues, in the fetus, and in the offspring during lactation were determined. As the intake of protein increased, the deposition of β-BHC in the liver of dams was reduced. However, the deposition was not influenced in the fetus–the amounts were originally low. In animals on a low protein diet, β-BHC deposition in pregnant rats was about twice as high as in non-pregnant rats. The stage of administration of ^{14}C-β-BHC (initial, middle and final stages of gestation) influenced the distribution of β-BHC, especially in the liver and kidney of the dam. There was a clear difference, i.e. a reduction, of β-BHC deposited in dams between the 5 and 10% casein in diets during the lactation period. The amount of β-BHC transferred from dam to offspring was about 10 times higher in the lactation period than in the gestation period.

75-0434. Voets, J. P.; Meerschman, P.; Verstraete, W. (Lab. Gen. Industrial Microbiol., Univ. Gent, Ghent, Belgium). **Soil microbiological and biochemical effects of long-term atrazine applications.** *Soil Biol. Biochem. 6(3):149-152; 1974.* (15 references)

The influence of long-term application of atrazine on the microflora and on various enzymatic activities of an apple orchard planted on loamy sand soil has been studied. Since 1958, soil between rows of dwarf apple trees has been treated each spring with atrazine at a rate of 4 kg/ha to remove all weeds. Samples of soil were taken in Feb. 1972, about 11-months after the previous application, and in March 1973, about 2 weeks after application. Long-term application caused a slight acidification of the soil, and the treated soil contained 1.27% humus while untreated oil has a humus content of 2.44%. The C/N ratio of treated and untreated plots was 7.2 and 6.6, respectively. The numbers of bacteria and fungi were not significantly affected by the herbicide. However, the numbers of anaerobic microorganisms as well as sporeformers and cellulolytic, proteolytic and ammonifying organisms were significantly lowered, even 11-months after the previous application. In contrast, *Azotobacter* spp. as well as proteolytic and ammonifying microorganisms appeared enhanced by the renewed atrazine application. Phosphatase, β-glucosidase, saccharase, and urease activities in treated plots were reduced to about 20-50% of controls. The ammonification capacity of the soil was only slightly altered by atrazine application. However, the nitrification potential of the soil was significantly reduced by the atrazine. Nitrite accumulation was not detected.

75-0435. Wisniewski, K.; Zawadzka, E.; Kocmierska-Grodzka, D. (Dept. Pharmacol., Med. Sch., Bialystok, Poland). **Influence of phosphororganic radioprotective drugs on post-irradiation changes of reactivity to barium chloride in guinea pig intestine.** *Strahlentherapie 148(1):107-115; 1974.* (27 references)

The effects of fenchlorfos and trichlorfon, representatives of a new group of radioprotective drugs, on the postirradiation disturbances in reactivity to barium chloride were studied in the guinea pig intestine. Both fenchlorfos and trichlorfon effected modification of the intestinal reactivity to barium chloride and other metabolic disturbances in the intestinal tissue of control animals. Some of the effects of these compounds, especially the influence on intestinal reactivity and tissue calcium content, were analogous to the changes evoked by irradiation. The two organophosphate insecticides decreased or normalized the majority of normally observed postirradiation disturbances and changes in tissue reactivity to barium chloride when administered before irradiation. This indicates remarkable radioprotective effectiveness of these substances.

75-0436. Panek, R.; Mackowiak, J.; Sarosiek, W.; Szymanski, A.; Wisniewski, K. (Dept. Pharmacol., Med. Sch., Bialystok, Poland). **Studies on the radioprotective effects of phosphororganic compounds combined with substances of different active centres and action mechanisms.** *Strahlentherapie 148(1):116-119; 1974.* (14 references)

The radioprotective effects of organophosphate compounds combined with cysteamine and dianabol were studied using adult male Wistar rats. The animals were given trichlorfon (50 or 100 mg/kg i.p.) or fenchlorfos (250 mg/kg by gastric tube) 3 hours before x-irradiation. Cysteamine (40 or 80 mg/kg i.p.) was given 15 minutes before irradiation, and dianabol (1.0 mg/kg by gastric tube) was given daily for 20 days before irradiation. Pretreatment with trichlorfon and cysteamine reduced the incidence of radiation-induced mortality, with a dose reduction factor (DRF) of 1.60. Given separately, both fenchlorfos and dianabol exerted a radioprotective effect, the DRF being 1.42 and 1.44, respectively. The DRF of fenchlorfos combined with cysteamine was 1.50, while that of fenchlorfos combined with dianabol was 1.72. The radioprotective effect was considerably reduced in previously dianabolized rats treated with fenchlorfos and cysteamine. The dosage must be carefully chosen to avoid the cumulation of toxic effects.

75-0437. Stefan, A.; Ceausescu, S.; Stancioiu, N. (Dept. Biol., Rumania). **Modificari histobiochimice ale unor**

componente sanguine la sobolani intoxicati cu TMTD. [Histobiochemical alterations of some blood components in male rats poisoned with TMTD (thiram).] *Stud. Cercet. Biol. Ser. Zool. 24(5): 443-450; 1972.* (7 references) (Rumanian)

Histochemical alterations of some blood components were studied in male Wistar rats kept on a diet supplying 0.015 mg thiram daily for 30 or 45 days. The treated animals exhibited appreciable loss of weight (188+25 g against 398+15 g in the control) and nervous disturbances. The erythrocyte count dropped from 6,000,000 per mm^3 to 2,000,000 per mm^3, and the hemoglobin level decreased from 15.5+0.25 g% to 9.2+0.09 g% at the same time. The leukocyte count increased to twice the normal value, which is indicative of the leukocytes' role in defending of the organism against the poison. The concentration of the globulin fraction increased from 35.1+0.1% to 44.3+0.35%, while the albumin level fell from 65+0.28% to 50.2+0.35%. Inhibition of the GOT and GPT activity and stimulation of the alkaline phosphatase activity by thiram were evident.

75-0438. Kimbrough, R. D.; Gaines, T. B.; Linder, R. E. (Chamblee Toxicol. Lab., Environ. Protect. Ag., Chamblee, GA). **The effect of 2,4-dichlorophenyl-*p*-nitrophenyl ether on the rat fetus.** *Toxicol. Appl. Pharmacol. 25(3): 456; 1973.*

In a reproduction study conducted in our laboratory and a similar study reported by Ambrose et al. (*Toxicol. Appl. Pharmacol.* 19, 263-275, 1971) dietary levels of 100 ppm or greater of technical 2,4-dichlorophenyl-*p*-nitrophenylether (TOK, nitrofen) fed to rats increased the number of dead pups. To determine whether the pups were stillborn or died immediately after birth, 8 male and 8 female rats were fed 500 ppm technical TOK in the diet. They were pair-mated after 61 days and, counting day of insemination as day 0, the fetuses were removed by Cesarian section on day 20 of pregnancy. All of the fetuses, a mean of 11.8/dam, were alive when taken but died during the next 12 hr. To determine whether a contaminant, or the TOK itself, produced the effect, 3 groups of 11 pregnant rats each were dosed with TOK in peanut oil, or peanut oil alone, by stomach tube on days 7 through 15 of pregnancy. Day of insemination was counted as day 0. Group 1 rats, given 50 mg/kg/day of pure TOK, produced 10 litters with an average of 2.2 live and 7.3 dead pups. Group 2, given 50 mg/kg/day of technical TOK, produced 11 litters with an average of 2.7 live and 9.5 dead pups. Group 3, given peanut oil alone, produced 11 litters with an average of 12.7 pups and none dead. Fetuses from dams exposed to TOK were cyanotic but normally formed. Hemoglobin and erythrocyte counts of fetuses from both TOK-treated and control dams were normal and methemoglobin was not elevated. Electron microscopic examination of the lungs of the pups suggested that poor expansion of the lungs in combination with less well developed lamellar bodies in alveolar epithelium and a possible effect on surfactant may cause the rapid death after birth of the offspring of the TOK-treated dams. (Author abstract by permission) (Abstract no. 45, 12th Annu. Meeting, Soc. Toxicol.)

75-0439. Cohen, S. D.; Murphy, S. D. (Univ. of Connecticut Sch. Pharm., Storrs, CT). **A simplified bioassay for predicting organophosphate potentiation.** *Toxicol. Appl. Pharmacol. 25(3): 483; 1973.*

Predictive tests for detecting malathion (MAL) synergists measure the effect of organophosphates on the detoxification of MAL or malaoxon (MX). Previous studies of MX detoxification required incubation of MX with tissue for a specified time after which an aliquot was removed and assayed in an anticholinesterase (antiCHE) test system to determine the amount of MX remaining. The simplified bioassay incorporates the initial MX-tissue incubation step directly into the antiCHE assay system. Fifty mg of mouse brain were added to Ringer bicarbonate buffer in Warburg flasks containing selected amounts of control or treated liver. At the start of the assay 0.5 nmol MX was added to the incubate and 25 min later acetylcholine (ACh) was added and brain CHE activity was measured manometrically. Liver activity, expressed as μl equivalents of MX inactivated, was calculated as the difference in CO_2 production between incubates containing brain, ACh and MX with and without liver. Mean ± SE activities of 10 mg of tissue from 5 or more control mice were 143 ± 9, 77 ± 13, 67 ± 8 and 56 ± 5 μl equivalents of MX inactivated by liver, lung, kidney, and plasma, respectively. Ultracentrifugation studies with liver indicated that microsomes contributed 61% of the total activity. Liver inactivation of MX was 40, 79 and 100% inhibited 18 hr after 0.5, 10, and 125 mg/kg (ip) of triorthotolylphosphate (TOTP, tri-*o*-cresyl phosphate), respectively. Other organophosphate potentiators of MAL proved to be potent inhibitors of MX detoxification as measured in the simplified bioassay system. A similar assay system was developed for measuring liver inactivation of paraoxon (PX). An 18-hr pretreatment with 125 mg TOTP/kg inhibited PX inactivation by 50% and caused a 4-5 fold increase in PX toxicity. Aldrin (16 mg/kg, po), given 4 days before sacrifice increased liver and plasma inactivation of MX and PX to 125 to 183% of control activity and decreased the acute toxicity of MX and PX. The simplified bioassay for determining tissue inactivation of MX or PX may be useful in predictive tests for detecting both synergists and antagonists of these organophosphates. (Author abstract by permission) (Abstract No. 117)

75-0440. Stevens, J. T.; Wagner, S. R.; Zemaitis, M. A.; Greene, F. E. (Dept. Pharmacol., M. S. Hershey Med. Cent., Hershey, PA). **Effect of chronic dieldrin exposure on the hepatic microsomal mixed function oxidase**

system from male and female rats. *Toxicol. Appl. Pharmacol. 25(3): 484; 1973.*

Previous results from this laboratory have shown that certain cyclodiene insecticides interact with components of the hepatic microsomal mixed function oxidase eyzymes that metabolize foreign compounds and that sex differences exist for these interactions (*Toxicol. Appl. Pharmacol.* 22, 309, 1972). The purpose of this study was to investigate the effects of feeding a diet containing 50 ppm dieldrin for 8 weeks on the activity of this enzyme system. In most instances maximal induction was achieved during the first week of feeding, although random fluctuations in some parameters were seen during the 8-week period. The level of NADPH cytochrome c reductase, cytochrome P-450 and NADPH oxidase remained significantly above control levels throughout the experiment, but no consistent sex differences were noted. The maximal spectral change (Amax)/mg protein induced by addition of ethylmorphine (EM), aniline (AN), and aldrin (AL) to microsomal suspensions was consistently higher in dieldrin-fed rats. However, when Amax was calculated in terms of cytochrome P-450 content, there was a 30-60% decrease for EM and AN. In contrast to these results, AL binding was increased in most instances regardless of the way the data were expressed. Determinations of the spectral binding constant (Ks) indicated that the apparent affinity of EM and AN for cytochrome P-450 was decreased by dieldrin feeding in female but not in male rats. The affinity of AL, however, was increased in both sexes. The induction effect of both EM and AN metabolism on female rats was maintained during the course of the experiment. However, AM and EM induction in male rats tended to decline over the 8-week period. Results from these experiments suggest that there may be sex differences in the effect of chronic dieldrin feeding on the metabolism of certain compounds, but that these differences may not be predictable by changes in content and activity of components of the mixed function oxidase system. (Author abstract by permission) (Abstract no. 118)

75-0441. Litterst, C. L.; Miller, E.; Michel, T.; Olivito, V.; Van Loon, E. J. (Div. Toxicol., Bur. Foods, Food Drug Admin., Nat. Cancer Inst., Bethesda, MD). **Distribution and penetration of lindane into brains of normal and phenobarbital pretreated dogs.** *Toxicol. Appl. Pharmacol. 25(3): 484-485; 1973.*

In earlier studies Koransky and Portig (*Naunyn-Schmiedeberg's Arch. Exp. Pathol. Pharmakol.*) 244: 564, 1963) investigated distribution of lindane (γ-BHC) in the rat. The purpose of the present investigation is to map out the levels and the degree of penetration of lindane in discrete areas of the central nervous system of the normal and phenobarbital-pretreated beagle dog. An iv infusion of lindane emulsion (15 mg/ml) was given to dogs that had been treated with phenobarbital in the diet, or to untreated dogs. In untreated dogs full convulsive seizure with loss of posture occurred within 20-35 min after the infusion began, at which time administration of lindane was terminated. Phenobarbital-pretreated dogs were infused for 60 min, at which time no signs of central nervous system excitability, with the exception of an occasional jerk, were evident. At the onset of the convulsions or after 60 min dogs were killed and the brains excised and dissected into 12 discrete structures. A section of the spinal cord also was obtained. The content of lindane in each structure was determined by gas-liquid chromatography. Lindane was recovered from all structures studied. Distribution of lindane was approximately equal in the brains of treated and non-treated dogs. The proportion of the administered dose of lindane was significantly smaller in the brains of phenobarbital-treated as compared to non-treated dogs. There appeared to be widespread localization in both white and grey matter. It was concluded that phenobarbital, in addition to acting as a physiological antagonist, alters the proportion of the administered dose of lindane in the central nervous system of the beagle dog, probably due to the increased rate of lindane metabolism. (Author abstract by permission) (Abstract no. 119)

75-0442. Van Gelder, G. A.; Smith, R. M. (Behavioral Toxicol. Lab., Vet. Diagnostic Lab., Ames, IA). **Delayed acquisition of a successive reversal behavioral task in dieldrin-dosed squirrel monkeys.** *Toxicol. Appl. Pharmacol. 25(3): 485; 1973.*

Dieldrin is a persistent chlorinated hydrocarbon insecticide. Clinical dieldrin toxicosis is manifested by neurological involvement. The present study investigated effect of subclinical exposure on acquisition of a non-spatial successive discrimination reversal task in adult male squirrel monkeys. Monkeys were required to meet a reversal criterion of 10 consecutive correct responses in a 30-min daily session before exposure began. On the day following the first reversal, the criterion was increased to 15 consecutive correct responses and the 55-day exposure period was started. The 0.1 mg/kg group achieved significantly fewer reversals than the low and control groups. There was no effect on acquisition in the 0.01 mg/kg exposed group. At the end of 55 days the average number of reversals/subject/day was 12 for the controls ($N = 3$), 17 for the 0.01 mg/kg group ($N = 4$), and 2 for the 0.1 mg/kg group ($N = 3$). During the following 54 days, exposure was discontinued in the 0.1 mg/kg group and increased to 0.1 mg/kg in the original 0.01 mg/kg group. The increased exposure level did not impair performance in the original 0.01 mg/kg group. The average number of reversals/subject/day at the end of the 54-day period was 11 for the controls, 18 for the original 0.01 mg/kg group, and 4 for the original 0.1 mg/kg group. The results showed that a continuous subclinical exposure to 0.1 mg/kg of dieldrin markedly impaired acquistion, while the same exposure had no effect on the maintaining of a high level of performance. (Author abstract by permission) (Abstract no. 120).

75-0443. Walsh, A. H.; Ribelin, W. E. (Chas. Pfizer Co., Groton, CT). **Lesions of pesticide poisoning in fish.** *Toxicol. Appl. Pharmacol. 25(3): 485; 1973.*

Two species of fish, coho salmon and lake trout, were chronically exposed to pesticides in order to determine whether characteristic lesions might be detected and found useful for the diagnosis of fish kills. Of the pesticides studied (carbaryl, malathion, DDT, thiodan (endosulfan), dieldrin, atrazine, and 2,4-D) none produced pathognomonic lesions and only carbaryl and atrazine produced lesions suggestive as to their cause. No changes characteristic of pesticides as a class were identified. The primary role of the pathologist in the diagnosis of pesticide-suspected fish kills would appear to be the elimination of the possible role of other factors such as infectious or nutritional disease. (Author abstract by permission) (Abstract no. 121)

75-0444. Witschi, H. (Dept. Pharmacol., Fac. Med., Univ. of Montreal, Montreal, Quebec, Canada). **The biochemical pathology of rat lung after acute paraquat poisoning.** *Toxicol. Appl. Pharmacol. 25(3): 485-486; 1973.*

The pathological biochemistry of the lung has so far received little attention, although biosynthesis of pulmonary macromolecules, activities of pulmonary enzymes and their response to metabolic inhibitors can be evaluated in ways quite similar to the approaches used for studying liver metabolism. In order to test how a specific lung poison would affect pulmonary biochemistry, we studied some acute effects of paraquat (1,1′-dimethyl-4,4′-bipyridylium dichloride). Given parenterally to rats, paraquat is known to produce within 12 to 24 hr such histopathological changes in the lung as acute edema, congestion, and widespread necrosis of pulmonary cells. The following enzyme activities were determined in lungs of male Sprague-Dawley rats (180-200 g) given from 20 to 80 mg/kg of paraquat ip: aryl hydrocarbon hydroxylase (benzpyrene hydroxylase), uridine kinase, ATPase and isocitric dehydrogenase. Only aryl hydrocarbon hydroxylase was inhibited in a dose-dependent manner 24 hr after paraquat administration; with doses of 20, 30, 40, 50 and 60 mg/kg ip, enzyme activities were 81, 70, 52, 55 and 27% of control levels. In a time-response study it was found that aryl hydrocarbon hydroxylase activities were somewhat lowered 12 hr after 60 or 80 mg/kg of paraquat and significantly depressed 18 hr after these doses. Forty and 30 mg/kg, however, failed to lower enzyme activities significantly at 12 and 18 hr and did so after 24 hr only. Paraquat also depressed pulmonary aryl hydrocarbon hydroxylase in rats treated with methylcholanthrene. In no instance was there any evidence that paraquat would depress the activity of hepatic aryl hydrocarbon hydroxylase. Activities of pulmonary uridine kinase, ATPase and isocitric dehydrogenase were never significantly affected by paraquat. The incorporation of orotic acid into total cellular RNA and of leucine into total protein was also not changed after a pretreatment of the animals with 20-60 mg/kg of paraquat for 24 hr. The interaction of paraquat with pulmonary microsomal enzymes might be of importance in the mechanism of the toxic action paraquat displays in lung. Measuring the activity of aryl hydrocarbon hydroxylase could also be used as a biochemical parameter for evaluating damage to pulmonary tissue. (Author abstract by permission) (Abstract no. 122)

75-0445. Brodeur, J.; Lambert, G. (Dept. Pharmacol., Fac. Med., Univ. Montreal, Montreal, Quebec, Canada). **Further studies on the effect of starvation and microsomal enzyme induction on the mobilization of DDT residues in rats.** *Toxicol. Appl. Pharmacol. 25(3): 488; 1973.*

The results of previous studies have shown that under certain experimental conditions the combination of starvation and enzyme induction has little advantage over starvation alone in mobilizing the residues of DDT from various tissues in rats. The present investigation was undertaken to study whether or not the experimental conditions could be optimized in such a way as to justify the combination of enzyme induction and starvation as a means of accelerating the decontamination of organisms. Adult female rats were contaminated with 100 mg/kg DDT po (10 mg/kg/day x 10 days). Then, in a first series of experiments, various groups of animals were treated orally during 14 days with phenobarbital (PB, 50 mg/kg/day), pregnenolone-16α-carbonitrile (PCN, 30 mg/kg/day), the potassium salt of 9α-fluoro-11β, 17-dihydroxy-3-oxo-4-androstene-17α-propionic acid (CS-1, 40 mg/kg/day), and dexamethasone acetate (2 mg/kg/day). On day 15, *p,p′*-DDT, *p,p′*-DDD (TDE) and *p,p′*-DDE were measured in blood, brain and abdominal fat tissue by GLC. The results show that PB was by far more effective than the other inducers in reducing significantly the concentrations of DDT residues in all three tissues. In a second series of experiments, groups of rats previously exposed to DDT as described above were subjected to periods of starvation of varying duration: 3 consecutive days (days 1, 2 and 3), 5 consecutive days (days 1,2,3,4 and 5), 3 nonconsecutive days (days 1, 3 and 5) and 5 nonconsecutive days (days 1, 3, 5, 7 and 9). Again, on day 15, the residues were measured in blood, brain and fat tissue. The results show that a significant reduction of the residues was obtained in all tissues only in animals starved for a period of 5 consecutive days. In a third series, rats were given PB (50 mg/kg/day, 14 days), while being also subjected to a 5-day period of starvation (days 1, 2, 3, 4 and 5). On sacrifice, day 15, it was seen that the combination of both treatments was more effective in reducing the concentration of the residues in all tissues than was either treatment used alone, although the combination did not yield strictly additive effects. In vitro studies conducted on liver microsomal enzyme preparations indicated that a 5-day period of starvation

markedly potentiates the inducing effect of a simultaneous pretreatment with phenobarbital (50 mg/kg/day, 5 days) on the amount of cytochrome P-450, as well as on the activity of aniline hydroxylase and aminopyrine-*N*-demethylase. These results show that under certain experimental conditions the combination of starvation and enzyme induction could lead to a greater depletion of pesticide residues from contaminated tissues than the use of either treatment alone. (Author abstract by permission) (Abstract no. 127)

75-0446. Wagstaff, D. J. (Dept. Vet. Physiol. Pharmacol., Univ. of Missouri, Columbia, MO). **Effects of chlorinated naphthalenes on liver levels of detoxication enzymes and vitamin A.** *Toxicol. Appl. Pharmacol. 25(3): 490-491; 1973.*

Chlorinated naphthalenes cause bovine hyperkeratosis, a disease in which hypovitaminosis A is a consistent lesion. This report is on the capacity of chlorinated naphthalenes to stimulate liver detoxication enzymes and association of this stimulated activity with vitamin A deficiency. Female Holtzman rats weighing 100 g were fed various chlorinated naphthalenes added to a vitamin A deficient diet. Hexobarbital sleep time was determined at 10 days. At 15 days, *O*-demethylation of *p*-nitroanisole and oxidative cleavage of EPN were measured in 10,000 × *g* supernatant fraction of liver. Vitamin A was determined in liver by a Carr-Price method. For organochlorine pesticides and PCB the threshold for liver enzyme stimulation is reported to be 1-10 ppm but when the α-chloro, β-chloro, 1,2-dichloro, 1,4-dichloro, or 1,2,3,4-tetrachloro derivatives of naphthalene were fed at 50 and 100 ppm there were no changes in the liver levels of enzyme activity or vitamin A. When 1,4-dichloronaphthalene was fed at 1000 ppm, *O*-demethylase and sleep time were stimulated. EPN detoxication was not stimulated until the feeding level was increased to 5000 ppm at which point body weight gains were impaired. Hepatic vitamin A concentrations were unchanged at all feeding levels. When a series of commercial formulations (Halowaxes) were fed at 3000 ppm, liver weights increased and body growth decreased. Enzyme activities increased as the percent chlorination of the product fed increased, but only up to a point above which activities started to decline from peak values. Again the pattern of responses for *O*-demethylase and EPN detoxication were different. Hepatic vitamin A concentrations were inconsistently decreased in some groups. It is concluded that dietary chlorinated naphthalenes stimulate liver detoxication enzymes, but at a higher threshold and with a different pattern than that reported for organochlorine pesticides and PCB. No consistent relationship between hepatic enzyme activities and levels of vitamin A was observed. (Author abstract by permission) (Abstract no. 132)

See also **75-0323** **75-0463** **75-0485**

75-0447. Anonymous. **CAM-1: Using enzymes to detect insecticides.** *Annu. Rep. 1972 Nat. Environ. Res. Cent. 39-43; 1972.*

Organophosphate and carbamate insecticides including azodrin (monocrotophos), DDVP (dichlorvos), dimetilan, malathion, parathion, paraoxon, and Sevin (carbaryl) interfere with physiological and neurological functions by inhibiting the action of cholinesterase-type enzymes. Their existence in waterways must be rapidly and accurately monitored. CAM-1, a fully engineered prototype model of a system using an immobilized enzyme product to detect organophosphate and carbamate pesticides in water has been developed. CAM is an acronym for "cholinesterase antagonist monitor." This method is cheaper and quicker than older methods of monitoring these pesticides. In order to create the CAM-1 system, a technique for bonding an enzyme to a carrier material so that the enzyme is active, conserved, and readily available, had to be developed. A second problem concerned the development of some rapid, convenient, accurate method for detecting hydrolysis of the substrate. These problems were solved by bonding the enzyme either to cotton or to polyurethane foam, and constructing an in-place, electrochemical method for determining the extent or degree of hydrolysis, which is an inverse measure of the inhibition of the enzyme. The critical element of the CAM-1 system is a pad of immobilized cholinesterase which is sandwiched between perforated platinum electrodes. Water is pumped through the pad and air and an enzyme-active reagent or substrate solution is forced through the cell. A battery is then connected across the platinum electrodes and a small current flows through the cell. When the substrate is being hydrolyzed at the maximum rate, the voltage across the cell will be produced in such a way as to be suitable for rough evaluation under field conditions.

75-0448. Stengle, T. R.; Lichtenberg, J. L.; Houston, C. S. (Dept. Chem., Univ. Massachusetts, Amherst, MA). **Sampling of glacial snow for pesticide analysis on the high plateau glacier of Mount Logan.** *Arctic 256(4):335-336; 1973.* (4 references)

Attempts were made to develop equipment for taking snow samples at high altitude in locations where work had to be done under adverse conditions and with simple equipment. Samples were taken at an elevation of 5,346 meters on Mount Logan, Yukon Territory, Canada. Work was performed at -20°C in high winds. Ninteen samples were taken at a depth of 1 to 15 meters. DDT was not detected in any of these samples. In 7 of the samples the lower limit of detectibility for DDT was 5 nanograms/liter. PCB contamination was not seen in the later samples but was present in earlier samples, presumably as a result of oily material found on the auger used for drilling. Results of this study indicate that sampling of glacial snow for trace organic pollutants is feasible even under unfavorable conditions using primitive techniques.

75-0449. Voss, G. (Ciba-Geigy, Ltd., Agrochem. Div., Basel, Switzerland). **Paraoxon degradation in vitro: a contribution to the methodology of assay procedures.** *Biochem. Pharmacol. 23(21):3068-3069; 1974.* (4 references)

The spectrophotometric determination of *p*-nitrophenol and the automated cholinesterase inhibition technique give identical results and are therefore equivalent tools for determining paraoxon degradation in vitro at relatively high substrate concentrations (7×10^{-5} *M*). Investigations at low substrate concentrations require the use of a sensitive anticholinesterase method. While the anticholinesterase assay is as reliable as any other analytical procedure, at low substrate concentrations nonspecific mechanisms can contribute to the disappearance of the substrate from the test solution. However, as soon as the saturation point is reached, the rate of degradation due to enzymatic cleavage can be measured in exactly the same way as with high substrate concentrations. The nonspecific mechanism contributing to paraoxon inactivation in preparations of rat liver and rat plasma was not detected in solutions of rabbit plasma incubated with the same concentration of paraoxon. Thus, any generalization regarding the unreliability of the enzymatic method is unjustified. Further research in this area should consider the reactions and kinetic parameters prevailing at low substrate concentrations.

75-0450. Spiro, S.; Trevisani, G. R. (Lab. Chim. Prov. Bolzano, Bolzano, Italy). **Studio di un metodo per la determiniazione simultanea di pesticidi clorurati e fosforati nell'aria. Nota 1: derivati cloro-organici. (Method for the simultaneous determination of chlorine- and phosphorus-containing pesticides in the air. 1. Chlorinated organic derivatives.)** *Boll. Lab. Chim. Prov. 24(5): 179-191; 1973.* (7 references) (Italian)

A sampling technique and gas-chromatographic method for the detection and quantitative determination of organochlorine pesticides (lindane, heptachlor, heptachlor epoxide, DDE, dieldrin, endosulfan, *o,p'*-DDT, endrin, *p,p'*-DDD (TDE), and *p,p'*-DDT) in the air is described. By passing air with a known quantity of pesticide through a bubbler filled with small glass balls coated with diethylene glycol, it was possible to quantitatively fix the pesticides in the diethylene glycol. After simple extraction with benzene, and washing with distilled water, the extract was analyzed by a gas-chromatograph with an electron capture detector, using nitrogen as carrier gas, and applying a column temperature of 180°C, a detector temperature of 190°C, and an injector block temperature of 220°C. The recovery rate was highest, between 90 and 100%, at an air flow rate of 10 liter/min, decreasing for flow rates of 15-20 liter/min. The air sample volume should not exceed $12 m^3$ for good recovery. Pesticide concentrations as low as 1 ng/m^3 were easily measured by the gas-chromatographic method.

75-0451. Anonymous. **Mitteilungen aus dem Bundesgesundheitsamt. Untersuchungsmethoden zur Bestimmung der Rueckstaende von Chlorkohlenwasserstoff-Pestiziden in oder auf Lebensmitteln tierischer Herkunft. (Reports by the Federal Bureau of Health. Methods for determination of residues of organochlorine pesticides in or on food of animal origin.)** *Bundesgesundheitsblatt 17(18): 269-276; 1974.* (18 references) (German)

Extraction, cleanup and analytical procedures for the qualitative and quantitative determination of organochlorine pesticide residues in or on food of animal origin, as recommended by the Federal Bureau of Health of West Germany, are presented. Only edible parts are used for residue analysis; results are expressed in terms of fat content that is determined by Soxhlet extraction. Milk is treated with methanol, sodium oxalate, diethylether and petroleum ether for the separation of milk fat. From seafood, fat is extracted with 2:1 mixture of hexane and acetone on a chromatographic column. The methods elaborated by Stijve, Specht, Hadorn and Zuercher, Schulte, Zimmerli and Marek, as well as the AOAC method are recommended for cleanup. When interference due to PCB's is anticipated, the latter can be separated from organochlorine pesticides by chromatographic method. The qualitative and quantitative determination is done by gas-chromatographic method. The limit of detectability lies at 0.01 ppm for aldrin, dieldrin, heptachlor, heptachlor epoxide, hexachlorobenzene, BHC isomers, *p,p'*-DDT and its metabolites and isomers. The detection limit of methoxychlor is 0.3 ppm.

75-0452. Mirkhaitov, T.; Ikromov, L. T. (Tashkent Inst. Pharma., Tashkent, USSR). **Opredeleniye fozalona i ftalofosa pri sudebno-khimicheskom analize biologicheskogo materiala. (Forensic determination of phosalone and phthalophos in biological materials.)** *Farmatsiya 22(6):64-67; 1973.* (5 references) (Russian)

A method for the extraction, cleanup, identification, and quantitative determination of phosalone and phthalophos (phosmet) in biological materials as encountered in forensic practice is described. Threefold extraction with ether at pH 5 permits recovery of up to 41% of phthalophos and up to 48% of phosalone. The extract is transferred into benzene for chromatographic cleanup on alumina and silicagel. Following elution with benzene, the dry residue is dissolved in alcohol for chromatographic identification on a silicagel layer, using chloroform as a solvent, and bromophenol blue with acetic acid for the visualization of the tracer. Another part of the eluate is evaporated, and the dry residue is mineralized with concentrated nitric acid and sulfuric acid for the quantitative identification of phthalophos and phosalone by a photocolorimetric method on the basis of the formation of phosphomolybdic blue, or by other known methods. The sensitivity of the quantitative determination amounts to 1 mg for phosalone, and 2 mg for phthalophos in 100 g sample.

75-0453. Parslow, R. (Brit. Sugar Corp., Ltd., Res. Labs., Colney, Norwich, Great Britain). **Methods of residue determination at the British Sugar Corporation research laboratories.** *IIRB (Inst. Int. Rech. Betterav.) J. 6(3):138-153; 1973.* (11 references)

The determination of residues in beet and beet products of Temik (aldicarb), dalapon, D-D, trifluralin, lindane, heptachlor, aldrin, dieldrin, and DDT was investigated. Temik and its metabolites are determined by solvent extraction, followed by solvent partition and coagulation clean-up procedures. After basic and acidic hydrolysis, released hydrolylamine is determined colorimetrically. Other determinations considered use electron capture gas-liquid chromatography to measure residues in cleaned up extracts. Dalapon is extracted as the free acid with aqueous phosphoric and phosphotungstic acids, and partitioned into diethyl ether. 'D-D' residues are extracted by a continuous solvent extraction/steam distillation procedure. A special apparatus designed to ensure efficient extraction is used since the volatility of D-D precludes subsequent evaporation of solvent. Trifluralin and the organochlorine insecticide residue determinations use solvent extraction, solvent partition and Florisil column chromatographic procedures. Precautions are necessary to avoid loss of residues and the introduction of extraneous materials resulting in interfering gas-liquid chromatography peaks. Recoveries and limits of detection are given for all methods studied.

75-0454. Ferren, W. P.; Vallese, F. M.; Fortinash, W. M. (Environ. Conserv. Program, Wagner Coll. Sci. Cent., Staten Island, NY). **Coulometric determination of organohalides in raw sugar.** *Int. Sugar J. 76(908):228-230; 1974.* (13 references)

Samples of raw sugar were analyzed coulometrically for organohalide residues. The organohalogen content ranged from 0.3 to 1.25 ppm, the highest and lowest concentrations both being found in samples of Australian raw sugar. The accuracy of the coulometric method was improved by replacing the second hydrogen peroxide evaporation step with the use of a stream of oxygen. In situations where hydrogen peroxide oxidation is required, elimination of the second evaporation step in favor of destruction of the peroxide by means of ceric ion is recommended. The use of ultrasonic agitation increases sample contact with the reagent, thereby giving greater analytical accuracy.

75-0455. Holmstead, R. L.; Khalifa, S.; Casida, J. E. (Div. Entomol. Parisitol., Univ. California, Berkeley, CA 94720) **Toxaphene composition analyzed by combined gas chromatography-chemical ionization mass spectrometry.** *J. Agr. Food Chem. 22(6): 939-944; 1974.* (11 references)

Fractionation of toxaphene on a silica gel-hexane column and then analysis by combined gas chromatography-chemical ionization mass spectrometry reveal a

complex mixture of at least 177 C_{10} polychlorinated derivatives. About two-thirds of these components are various $C_{10}H_{11}Cl_7$, $C_{10}H_{10}Cl_8$, and $C_{10}H_9Cl_9$ compounds. The remaining components are $C_{10}H_{10}Cl_6$, $C_{10}H_{12}Cl_6$, $C_{10}H_9Cl_7$, $C_{10}H_8Cl_8$, $C_{10}H_7Cl_9$, $C_{10}H_8Cl_{10}$, and $C_{10}H_7Cl_{11}$ derivatives. Based on the total ion current on mass spectrometry of fractionated toxaphene, 26 of these components, each present in 1.0–2.5% amounts, make up 40% of this insecticide. Reduction of toxaphene with triphenyltin hydride yields several mono- and polychloro-derivatives but the major product is bornane, formed in about 20% yield. This study provides some of the information needed for analysis of toxaphene and toxaphene-derived residues by combined gas chromatography–mass spectrometry with the chemical ionization source. (Author abstract reprinted by permission of the American Chemical Society)

75-0456. Hill, B. D.; Stobbe, E. H. (Dep. Plant Sci., Univ. Manitoba, Winnipeg, Manitoba, Can. R3T 2N2) **The use of ultrasonic extraction in the determination of some s-triazine herbicides.** *J. Agr. Food Chem. 22(6): 1143-1144; 1974.* (8 references)

Atrazine (2-chloro-4-ethylamino-6-isopropylamino-s-triazine), cyanazine (2-(4-chloro-6-ethylamino-s-triazin-2-ylamino)-2-methylpropionitrile), and cyprazine (2-chloro-4-cyclopropylamino-6-isopropylamino-s-triazine) were extracted from soils with aqueous methanol using an ultrasonic cleaner. Cleanup consisted of chloroform partitioning and column chromatography on deactivated basic alumina. Extracts were determined by gas chromatography with alkali flame ionization detection. After allowing *s*-triazine adsorption, recoveries from soils fortified at 1 ppm ranged from 81.6 to 94.5%. Two 15-min ultrasonic extractions were comparable to 24 hr of Soxhlet extraction for atrazine. (Author abstract reprinted by permission of the American Chemical Society)

75-0457. Eberle, D. O.; Suter, R.; Nowak, K.; Bosshardt, H. P. (Ciba-Geigy S. A., Basel, Switzerland) **CIPAC collaborative study of the heat-stability of diazinon formulations, using both CIPAC and AOAC analytical methods.** *J. Ass. Offic. Anal. Chem. 57(1): 48-52; 1974.* (11 references)

Diazinon (*O,O*-diethyl *O*-(2-isopropyl-6-methyl-4-pyrimidinyl) phosphorothioate) and 3 different Diazinon formulations were analyzed both by the official CIPAC titrimetric method and by the AOAC official first action gas chromatographic method. In addition, all samples were subjected to the CIPAC accelerated storage test by heating (2 weeks at 54°C) and analyzed by the 2 methods before and after storage. Eight collaborators from European countries and the United States took part in the study. Analytical results were reproducible within and between laboratories by both methods. As demonstrated by an analysis of variance, the 2 procedures yielded identical results. Therefore, both the CIPAC and the AOAC methods may be considered as equivalent with good accuracy and reproducibility. After storage at 54°C for 14 days only one Diazinon dust formulation revealed a significant decrease in Diazinon content as shown by a *t*-test. (Author abstract by permission)

75-0458. Barney, J. E., II (Stauffer Chem. Co., Western Res. Cent., 1200 S. 47th St., Richmond, CA, 94804) **Collaborative study of the gas chromatographic determination of six thiocarbamate herbicides in formulations.** *J. Ass. Offic, Anal. Chem. 57(1): 53-59; 1974.* (18 references)

Eptam (EPTC), Ordram (molinate), Ro-Neet, Sutan (butylate), Tillam (pebulate), and Vernam (vernolate) thiocarbamate herbicides are determined in emulsifiable and granular formulations by gas chromatography on the OV-1, SE-30, or OV-17, column with a flame ionization detector. Another thiocarbamate is used as an internal standard. The method was tested collaboratively by 19 laboratories, 18 of which tested the method on all 6 thiocarbamates. The coefficient of variation for 12 formulations was 3.10%. A significant amount of systematic error was detected, particularly in the analysis of emulsifiable formulations. The method has been adopted as official first action, and it is recommended that additional studies by conducted. (Author abstract by permission)

75-0459. Ealy, D. B.; Gorman, R. R.; Kaiser, F. R.; Scroggs, R. E. (Elanco Prod. Co., Div. Eli Lilly and Co., Indianapolis, IN 46206). **Determination of Siduron in fertilizers by flame ionization gas-liquid chromatography.** *J. Ass. Off. Anal. Chem. 57(1): 60-61; 1974.*

Siduron is formulated with fertilizers at about 2.4%. The herbicide is extracted with $CHCl_3$, using a magnetic stirrer, *p,p'*-methoxychlor is added as an internal standard, and the relative GLC peak heights are determined. The GLC column is 3% JXR on Gas-Chrom Q, and the mode of detection is hydrogen flame ionization. (Author abstract by permission)

75-0460. Griffitt, K. R.; Craun, J. C. **Gel permeation chromatographic system: an evaluation.** *J. Ass. Offic. Anal. Chem. 57(1): 168-172; 1974.* (3 references)

A gel permeation chromatography (GPC) system, including an automated GPC instrument, was evaulated and was found to be a reliable and efficient tool for fat-pesticide separations. In most cases more than 98% of the fat or oil was eluted from the column before the pesticides fraction began to elute. Cleanup efficiency were better than those obtained with acetonitrile partitioning, even when a petroleum ether backwash was used. Recoveries of several pesticides and industrial

chemicals from milk fat were determined, with GPC as the only cleanup technique employed before gas chromatographic determination. Recoveries generally were betten than thos obtained with acetonitrile partitioning followed by Florisil cleanup. The automated instrument can be in operation unattended during nonworking hours and, after loading, will automatically clean up 23 individual fat samples. (Author abstract by permission)

75-0461. Caswell, R. L. (Criteria and Eval. Div., Off. Pestic. Programs, Environ. Prot. Ag., Washington, DC 20640) **Report on pesticide formulations.** *J. Ass. Offic. Anal. Chem. 57(2): 249-251; 1974.*

Progress, plans and recommendations are described for the study of analytical methods for pesticide formulations containing aldicarb, arsenic, carbaryl, chlordane, heptachlor, chlorophenoxy herbicides, chlorobenzilate, chloropropylate, dinocap, ethion, formothion, dicofol, mercurials, methoxychlor, picloram, 2,4-D, rotenone, EPTC, molinate, Ro-neet, butylate, pebulate, vernolate, simazine and propazine.

75-0462. Hankin, L. (Conn. Agr. Exp. Sta., Box 1106, New Haven, CT 06504). **Report on Enzymes.** *J. Ass. Offic. Anal. Chem. 57(2): 267-268; 1974.* (3 references)

The General Referee on the topic of enzymes reported that a collaborative study was performed on the determination of catalase and peroxidase in frozen vegetables and on the galactose oxidase method for milk in meat products. Work was reported on the use of the TLC-enzyme inhibition technique to verify the effects of carbamate pesticides on esterases determined spectrophotometrically. Results obtained by TLC-EI for methomyl *syn* and *anti* isomers were directly related to the toxicity index (= LD50 for parathion divided by LD50 for the test compound) and to *I*50 (=-log (I50)).

75-0463. Lorah, E. J.; Hemphill, D. D. (Dep. Hort., Univ. Missouri, Columbia, MO 65201). **Direct chromatography of some *N*-methylcarbamate pesticides.** *J. Ass. Offic. Anal. Chem. 57(3): 570-575; 1974.* (12 references)

Carbaryl (1-naphthyl methylcarbamate), Mesurol (4-methylthio-3,5-xylyl methylcarbamate, methiocarb), promecarb (*m*-cym-5-yl methylcarbamate), Zectran (4-dimethylamino-3,5-xylyl methylcarbamate, mexacarb), and 4-dimethylamino-3,5-xylenol were successfully chromatographed on Chromosorb W support, surface-modified with Carbowax 20M. The intact compounds were detected by means of the nitrogen or sulfur response of an alkali flame detector. Calibration curves were linear over the range 4 to 2000 ng. Average pesticide recoveries of 90-100% were obtained from fortified vegetable samples. (Author abstract by permission).

75-0464. Erney, D. R. (Food Drug Admin., Detroit, MI 48207). **Rapid screening method for analysis of chlorinated pesticide and polychlorinated biphenyl residues in fish.** *J. Ass. Offic. Anal. Chem. 57(3): 576-579; 1974.* (10 references)

Ground fish is dried with anhydrous Na_2SO_4, packed into a chromatographic column, and extracted with petroleum ether. An aliquot of extract is cleaned up on miniature chromatographic columns of Florisil and silica gel. GLC analyses of a variety of fish samples by both the proposed procedure and multipesticide residue methods gave comparable results. The described procedure is rapid, economical, and applicable to routine analysis of fish samples. (Author abstract by permission)

75-0465. Van Hove Holdrinet, M. (Prov. Pestic. Residue Testing Lab., Ontario Min. Agr. Food, Univ. Guelph, Guelph, Ontario, Canada N1G2W1). **Determination and confirmation of hexachlorobenzene in fatty samples in the presence of other residual halogenated hydrocarbon pesticides and polychlorinated biphenyls.** *J. Ass. Offic. Anal. Chem. 57(3):580-584; 1974.* (14 references)

Hexachlorobenzene (HCB) determination and confirmation at low residual levels (parts per billion range) is hampered by the presence of electon-capturing co-extractiles, other organochlorine pesticides, and polychlorinated biphenyls (PCBs). A method is described to routinely examine lipid material for residual HCB, using a column chromatographic separation system and subsequent derivatization. Following initial extraction and cleanup, organochlorines, PCBs, and HCB are successively eluted from a charcoal column. After gas chromatographic analysis of each of the fractions, the HCB fraction is subjected to caustic alkali at high temperatures, and the hydrolyzed product is methylated to yield the pentachlorophenol methyl ether derivative. (Author abstract by permission).

75-0466. Chau, A. S. Y. (Canada Cent. Inland Waters, Water Quality Br., Dep. Environ., Burlington, Ontario, Canada L7R4A6). **Confirmation of pesticide residue identity. VII. Solid matrix derivation procedure for the simultaneous confirmation of heptachlor and endrin residues in the presence of large quantities of polychlorinated biphenyls.** *J. Ass. Offic. Anal. Chem. 57(3):587-591; 1974.* (17 references)

Heptachlor is converted almost quantitatively (90%) to 1-hydroxychlordene, and endrin is converted to the ketone in 75% yield. Because of the diversity in polarity of these derivatives and the unreacted polychlorinated biphenyls, they are clearly separated. This procedure has been applied routinely to extracts obtained from fish, sediment, and water samples. (Author abstract by permission)

75-0467. Rangaswamy, J. R.; Majumder, S. K. (Cent. Food Technol. Res. Inst., Mysore-570013, India).

Colorimetric method for estimation of carbaryl and its residues on grains. *J. Ass. Offic. Anal. Chem. 57(3):592-594; 1974.* (8 references)

A new colorimetric method for the estimation of carbaryl, 1-naphthyl *N*-methylcarbamate, based on its reaction with diazotized *o*-toluidine, has been described. The absorption maximum of the red color formed is measured at 520 nm. The method is sensitive to 0.1 μg carbaryl/20 g sample, with an estimation limit of 1 μg, and can be applied to 10% dust formulations of carbaryl. (Author abstract by permission)

75-0468. Griffith, F. D., Jr.; Blanke, R. V. (Commonw. Virginia Div. Consol. Lab. Serv., Richmond, VA 23219). **Microcoulometric determination of organochlorine pesticides in human blood.** *J. Ass. Offic. Anal. Chem. 57(3):595-603; 1974.* (17 references)

Improvements in the microcoulometric halogen system allow analysis of as little as 1 ppb chlorinated pesticides with specificity and linearity. Modifications were made in the sulfuric acid method of extracting pesticides from human whole blood to obtain recovery of 24 pesticides and 7 industrial chemicals. Recovery data were tabulated. Retention time and response tables for OV-210 and SE-30/QF-1 columns were prepared for these compounds, using the microcoulometric detector. (Author abstract by permission)

75-0469. Woolson, E. D. (Agr. Environ. Quality Inst., Agr. Res. Serv., U. S. Dep. Agr., Beltsville, MD 20705). **Extraction of chlorinated hydrocarbon insecticides from soil: Collaborative study.** *J. Offic. Ass. Anal. Chem. 57(3): 604-609; 1974.* (8 references)

Soil premoistened with 0.2*M* NH_4Cl was shaken with hexane-acetone (1+1) to extract chlorinated hydrocarbon insecticides. Standard AOAC methods (29.014 and 29.017) were used for cleanup and detection of residues in the extract. Seven laboratories analyzed 3 soil unknown samples which contained 6 added insecticides each (at a range of 0.24 to 6.18 ppm) and a spike-and-recovery sample which contained 10 insecticides. Recovery from the spiked sample averaged 91% (86-100%) of the added insecticides, with an average coefficient of variation of 13.54%. Recovery from the 3 unknown samples averaged 88% (69–118%) with a coefficient of variation of 12.84%. The method has been adopted as official first action. (Author abstract by permission)

75-0470. McDermott, W. H. (Res. Devel. Dep., Union Carbide Corp., South Charleston, WV). **Collaborative study of the infrared spectrophotometric determination of aldicarb in formulations.** *J. Ass. Offic. Anal. Chem. 57(3):642-644; 1974.* (2 references)

An infrared method for the determination of aldicarb in formulations was studied collaboratively. The carbamate carbonyl infrared absorption band at 5.75 μm of the aldicarb is measured after extraction of the aldicarb from the formulation with methylene chloride in a Soxhlet extractor. A statistical evaluation of the data by the technique of matched pairs at the 10% level shows a random standard deviation of 0.21%, a systematic standard deviation of 0.26%, and an overall standard deviation of 0.43%. The method has been adopted as official first action. (Author abstract by permission)

75-0471. Decker, O. D.; Frank, R. (Eli Lilly and Co., Greenfield Lab., Greenfield, IN 46140). **Determination of the herbicide isopropalin in technical grade material and in formulations.** *J. Ass. Offic. Anal. Chem. 57(3):645-647; 1974.* (4 references)

Two methods are described for the determination of isopropalin (2,6-dinitro-*N,N*-dipropylcumidine) in technical grade material (a concentrate in xylene) and emulsifiable concentrate formulations. Samples measured spectrophotometrically are purified by Florisil column chromatography. Samples measured gas chromatographically are dissolved in chloroform, mixed with the internal standard, and then injected into a gas chromatograph equipped with a flame ionization detector. (Author abstract by permission)

75-0472. Colvin, B. M.; Engdahl, B. S.; Hanks, A. R. (Dep. Agr. Anal. Serv., Texas A&M Univ., College Station, TX 77843). **Determination of carbaryl in pesticide formulations and fertilizers by high-pressure liquid chromatography.** *J. Ass. Offic. Anal. Chem. 57(3):648-652; 1974.* (11 references)

A simple and rapid method is described for the determination of carbaryl in pesticide formulations by high-speed liquid chromatography. Carbaryl is extracted with 10% methanol in chloroform and pentachlorophenol is added as an internal standard. The sample extract is injected into a liquid chromatograph, and peak height ratios are used for quantitative measurement. Chromatography is complete in 8 min. The method compares favorably with infrared, near infrared, and colorimetric procedures for carbaryl. (Author abstract by permission)

75-0473. Black, R. F.; Kurtz, C. P.; Baum, H. (Rohm and Haas Co., Philadelphia, PA 19137). **Spectrophotometric assay of karathane technical and karathane formulations.** *J. Ass. Offic. Anal. Chem. 57(3):653-657; 1974.* (6 references)

A spectrophotometric procedure for the determination of total dinitrooctylphenols and dinitrooctylphenyl crotonates in Karathane Technical (dinocap) and Karathane formulations has been collaboratively studied. The sample is dissolved in petroleum

ether; the total mono- and dinitrooctylphenols are then selectively extracted with aqueous sodium hydroxide solution and examined photometrically at 410 nm. The dinitrooctylphenyl crotonates are hydrolyzed in aqueous pyridine solution and measured photometrically at 442 nm. Five collaborators analyzed Karathane Technical, Karathane LC, and Karathane WD in dulplicate on each of 2 days. Statistical analysis indicates that between-laboratory precision, s, of the dinitrooctylphenyl crotonate determination, excluding outliers, was 2.05, 0.71, and 0.79% absolute at the 76, 38, and 18% assay levels, respectively. The precision of the dinitro-octylphenol determination on the same sample series was $s = 0.071\%$ at the 2.3% concentration level, 0.18% at the 1.88% level, and 0.457% at the 2.20% level, respectively. It is recommended that another collaborative study be conducted with an increased number of collaborators, incorporating changes in the procedure suggested by the collaborators. (Author abstract by permission)

75-0474. Corley, C.; Miller, R. W.; Hill, K. R. (Anal. Chem. Lab., Agr. Environ. Qual. Inst., Beltsville, MD 20705). **Determination of *N*-(4-chlorophenyl-*N'*-(2,6-difluorobenzoyl)urea in milk by high-speed liquid chromatography.** *J. Ass. Offic. Anal. Chem. 57(6): 1269-1271; 1974.* (3 references)

A rapid and sensitive method of analysis in which high-speed liquid chromatography was used with ultraviolet absorption detection was developed for determining residues of Thompson-Hayward TH 6040 (*N*-(4-chlorophenyl)-*N'*-(2,6-difluorobenzoyl)urea in cow's milk. The larvicide is extracted from whole milk with ethyl acetate, and the lipids are removed by partitioning between hexane and acetonitrile. After evaporation of the acetonitrile, the residue is dissolved in ethanol, and aliquots are injected into a liquid chromatograph, using methanol-water (1+1) as the mobile phase in a packed column. Recovery of TH 6040 from cow's milk is essentially quantitative, and no interfering substances appear on the chromatogram. The lowest detectable level was 10 ng. Milk from a cow fed 1 mg larvicide/kg body weight daily in the diet was analyzed by this procedure, and no detectable residues ($<$ 0.1 ppm) were found over a 15 week sampling interval. (Author abstract by permission)

75-0475. Coburn, J. A.; Chau, A. S. Y. (Water Qual. Br., Canada Cent. for Inland Waters, Environment Canada, Burlington, Ontario, Canada). **Confirmation of pesticide residue identity. VIII. Organophosphorus pesticides.** *J. Ass. Offic. Anal. Chem. 57(6): 1272-1278; 1974.* (26 references)

A chemical confirmation for 5 organophosphorus pesticides is described. After extraction and quantitation by flame photometric detector gas-liquid chromatography (GLC), the organophosphorus pesticides are hydrolyzed in a 10% methanolic-potassium hydroxide solution, followed by derivatization with pentafluorobenzyl bromide to produce the pentafluorobenzyl (PFB) ethers of the phenolic hydrolysis products. The PFB ethers are subsequently fractionated on a silica gel microcolumn, and analyzed by electron capture GLC. The preliminary chromatographic results of the electron capture GLC analysis of the PFB ethers of the phenolic hydrolysis products of several *N*-methylcarbamates are also presented. As little as 0.01 ppb ronnel and crufomate and 0.10 ppb parathion, fenitrothion, and methyl parathion in a 1 liter water sample can be confirmed. (Author abstract by permission)

75-0476. Sarna, L. P.; Webster, G. R. (Pestic. Res. Lab., Dept. Soil Sci., Univ. of Manitoba, Winnipeg, Manitoba, Canada). **Conductivity detector for nitrogen compounds: maintenance program enabling gas-liquid chromatographic analysis of trace residues in crude soil extracts.** *J. Ass. Offic. Anal. Chem. 57(6): 1279-1281; 1974.* (6 references)

A maintenance program for the Coulson conductivity detector is described which incorporates a new rapid method of decontaminating the stainless steel transfer lines and the vent valve of the detector system. Regular use of these maintenance procedures facilitates use of the Coulson conductivity detector for the analysis of trace residues of nitrogen-containing herbicides in crude soil extracts by maintaining detector sensitivity over an extended period of time and ensuring reliable performance from the instrument. Thus it is possible to avoid lengthy cleanup of analytical samples and the losses of material which might be involved, and to make maximum use of selective response of the Coulson conductivity detector. Approximately 2 days' down time is required every 3 months for this procedure. (Author abstract by permission)

75-0477. Grift, N.; Lockhart, W. L. (Dept. Environ., Freshwater Inst., Univ. of Manitoba, Winnipeg, Manitoba, Canada). **Gas-liquid chromatographic determination of fenitrothion in fish, water, and sediment.** *J. Ass. Offic. Anal. Chem. 57(6): 1282-1284; 1974.* (8 references)

A procedure is described for the determination of fenitrothion (*O,O*-dimethyl *O*-4-nitro-3-methylphenyl thiophosphate) residues in fish tissue, water, and sediment. Fish and sediment samples are extracted with ethyl acetate and cleaned up by partitioning with hexane and passing through Florisil columns. Extracts are analyzed by gas-liquid chromatography, using a flame photometric detector to determine phosphorus and sulfur. Mean recoveries of triplicate analyses of fish muscle samples spiked with 0.1-5.0 μg fenitrothion/g were 94-110%. (Author abstract by permission)

75-0478. Singh, J.; Lapointe, M. R. (Anal. Serv. Sect., Plant Prod. Div., Canada Dept. Agr., Ottawa, Ontario, Canada K1A OC5). **Confirmation of six organothiophosphorus pesticides by chemical derivation at nanogram levels.** *J. Ass. Offic. Anal. Chem. 57(6): 1285-1287; 1974.* (11 references)

A confirmatory procedure is described in which organothiophosphorus compounds are oxidized with neutralized sodium hypochlorite solution and the oxidation products are subjected to gas-liquid chromatography, using a flame photometric detector. Six pesticides, diazinon, ronnel, malathion, parathion, methyl parathion, and fenitrothion, were studied in 4 different substrates, peaches, blueberries, apples, and lettuce, at fortification levels of 0.25-0.5 ppm. These pesticides can be confirmed when present individually or in combination. Three pesticides, parathion, malathion, and diazinon, were shown to produce the corresponding oxons or oxygen analogs with retention times identical with the corresponding oxon reference standards. (Author abstract by permission)

75-0479. Bhagwat, V. M.; Ramachandran, B. V. (Biochem. Div., Nat. Chem. Lab., Poona 8, India). **Determination of EPN, its oxygen analog, and *p*-nitrophenol in aqueous suspensions and enzymic digests.** *J. Ass. Offic. Anal. Chem. 57(6): 1288-1293; 1974.* (19 references)

O-Ethyl *O*-*p*-nitrophenyl phenylphosphonothioate (EPN), its oxygen analog *O*-ethyl *O*-*p*-nitrophenyl phenylphosphonate (EPNO), and *p*-nitrophenol (PNP) are completely extractable from slightly acidic aqueous suspensions or enzymic digests by a mixture of equal volumes of benzene and isobutanol. In shaking the extract with 0.05*N* NaOH, PNP is quantitatively partitioned into the aqueous phase and can be determined spectrophotometrically at 410 nm. Aliquots of the solvent phase which now contains EPN and EPNO are evaporated to dryness at 120°C. One portion of the residue is treated with ethanol and alkaline hydroxylamine. The PNP liberated is equivalent to the total EPN +EPNO. Another portion of the residue is dissolved in cyclohexane and shaken with alkaline hydroxylamine. EPNO, which has a greater reactivity and is more soluble in water, is rapidly decomposed to PNP and can be measured as above. EPN remains unaffected in the cyclohexane phase under these conditions. The value for EPN is calculated either by difference or, when necessary, by evaporating the cyclohexane and decomposing the residue with ethane and hydroxylamine. The method is sensitive to 0.1 μmole EPN, EPNO, or PNP and can be used in the study of enzyme systems converting EPN and EPNO to PNP or EPN to EPNO. It can also be used in monitoring the preparation of EPNO from EPN by bromine water. (Author abstract by permission)

75-0480. Buser, H.; Grolimund, K. (Cent. Function Res., Ciba-Geigy Ltd., Basel, Switzerland). **Direct determination of *N'*-phenyl urea derivatives in herbicide technical products and formulations, using gas-liquid chromatography.** *J. Ass. Offic. Anal. Chem. 57(6): 1294-1299; 1974.* (6 references)

The direct gas-liquid chromatography of a number of *N'*-phenyl-*N*-methoxy-*N*-methylureas has been investigated. Representatives of both groups have been studied in detail, calibration curves using an internal standard have been established, and herbicide technical products as well as formulations have been analyzed quantitatively. A 2 or 3% silicone SE-30 column was used in conjunction with a flame ionization detector. Operating temperatures were chosen on the basis of thermal stability data obtained by differential scanning calorimetry. Gas-liquid chromatography-mass spectroscopy coupling has confirmed that intact urea compounds elute from the chromatographic column. (Author abstract by permission)

75-0481. Vyboh, P.; Michalek, M.; Sustek, J.; Batora, V. (Res. Inst. Agr. Technol., Bratislava, Czechoslovakia). **Gas chromatographic determination of technical pyrazon (5-amino-4-chloro-2-phenyl-3 (2H) pyridazinone).** *Pestic. Sci. 5(2): 171-176; 1974.* (9 references)

5-Amino-4-chloro-2-phenyl-3(2H)pyridazinone (common name pyrazon) is the active ingredient of herbicide formulations known under the trade names Burex, Chlorazine, Pyramina, and Phenazon. Pyrazon content was evaluated using the internal standard 4-chloro-5-methylamino-2-phenyl-3(2H)pyradazinone. The FID detector and a glass column (50 X 0.25 cm) packed with 2% cyclohexane-di-methanol succinate on silanized Chromosorb G(80-100 mesh) were used. Technical products can contain two interesting impurities, the non-active pyrazon isomer 4-amino-5-chloro-2-phenyl-3(2H)pyridazinone, and the unreacted 4,5-dichloro-2-phenyl-3(2H)pyridazinone, the latter of which is significant from the point of view of toxicology. Determination of these two compounds under the conditions used for pyrazon is practically impossible. They were therefore determined on a separate glass column (70 X 0.24 cm) packed with 5% cyclohexane-dimethanol succinate on Chromosorb G (60-80 mesh). A standard addition method for small concentrations of 4,5-dichloro-2-phenyl-3(2H)pyridazinone in technical pyrazon products is also described. (Author abstract by permission)

75-0482. Lawrence, J. F. (Food Res. Lab., Dept. Nat. Health Welfare, Ottawa, Ontario, Canada). **Effects of some operating parameters on the response of the Coulson conductivity detector.** *J. Chromatogr. 87(2): 333-339; 1973.* (4 references)

The variation in response with changes in operating conditions of the Coulson conductivity detector to some triazine herbicides was examined.

Parameters such as water and hydrogen flow-rates as well as pyrolysis furnace temperature were investigated. Maximum response was obtained with equal flow-rates in the mixing chamber and siphon arm. However, tailing of peaks increased at slow water flow-rates. Hydrogen flow-rates of 30-70 ml/min produced the highest response. Sensitivity increased with increasing furnace temperature. (Author abstract by permission)

75-0483. Gosselin, C.; Martin, G. B.; Boudreau, A. (Dept. Vivres, Fac. Sci. Agr. Aliment., Univ. Laval, Quebec, Quebec, Canada). **Contamination problems with ^{63}Ni electron capture detectors.** *J. Chromatogr. 90(1): 113-118; 1974.* (5 references)

A study was performed on two ^{63}Ni electron capture detectors operating in d.c. mode. Several parameters have been examined. It appeared that the temperature difference between the detector and the column is important. Scavenger gas temperature and detector isolation are not less important. Furthermore the detector polarization switch must always be off when no chromatogram is being run. These modifications help to keep the detector sensitivity much longer, with a consequent reduced number of washings. Decontamination is particularly important in the examination of pesticide samples, e.g., organochlorine extracts containing oily materials. (Author abstract by permission)

75-0484. Leferink, J. G.; Leclerq, P. A. (Lab. Instrument, Anal., Eindhoven Univ. of Technol., Eindhoven, The Netherlands). **Direct coupling of high-resolution open-hole glass tubular columns to a mass spectrometer for biochemical applications.** *J. Chromatogr. 91: 385-391; 1974.* (16 references)

In order to use the combination high-resolution gas chromatograph–mass spectrometer at high sensitivity for complex compounds of biological origin, direct coupling of the column to the ion source appeared to be the best solution. An AEI MS-12 mass spectrometer has been modified to accept the total effluent of open-hole glass capillary columns. An all-glass interface, containing a restriction, was designed for the coupling. Results show high sensitivity, an excellent usability for different types of compounds and no loss of resolution in total ion current vs. flame ionization detector chromatograms. (Author abstract by permission)

75-0485. Nitsche, I.; Selenka, F.; Ballschmiter, K. (Abt. Anal. Chem., Univ. Ulm, D 79 Ulm, Germany). **Zum Metabolismus von Dialkyldithiocarbamaten. I. Mitt. Bestimmung der beim Abbau entstenhenden Amine durch Umsetzung mit Isocyanaten und gaschromatographische Identifizierung der gebildeten Harnstoffderviate. [Metabolism of dialkyldithiocarbamates. Part I. Determination of the amines formed during degradation by reaction with isocyanates and gas chromatographic determination of the resulting urea derivatives.]** *J. Chromatogr. 94: 65-73; 1974.* (43 references)

N,N'-Di- and *N,N',N'*-trisubstituted ureas, formed by the reaction of amines with isocyanates, e.g. *tert.*-butyl isocyanate or 3-trifluoromethylphenyl isocyanate, are useful derivates for the gas chromatographic analysis of primary and secondary amines. The separation is carried out at temperatures between 70 and 130° on liquid phases such as silicon OV-101 and silicon OV-17. With nitrogen and electron capture detectors the detection limit is 10^{-10} g. Trace analysis of simple primary and secondary amines is important for the study of the metabolism of dialkyl dithiocarbamate fungicides or urea herbicides. Since secondary amines are considered to be potential precursors of carcinogenic nitrosamines their analysis is also of great importance. (Author abstract by permission)

75-0486. Smith, A. E. (Agriculture Canada, Res. Sta., Regina, Saskatchewan, Canada). **A multi-residue extraction procedure for the gas chromatographic determination of the herbicides dichlobenil, dinitramine, triallate and trifluralin in soils.** *J. Chromatogr. 97(1):103-106; 1974.* (16 references)

Samples of Jameson sandy loam, Regina heavy clay and Melfort silty clay were fortified with 1 or 10 μg of individual herbicides, dichlobenil, dinitramine, triallate, or trifluralin, to give a soil concentration of 0.05 or 0.5 ppm. The fortified soils were frozen at -5° for 8 weeks. Each fortified soil sample (20 g) was mixed with 60 ml of acetonitrile-water (9:1) and extracted for 2 min using a Sonic Dismembrator. After settling, 30 ml of the acetonitrile solution were added to 150 ml distilled water plus 20 ml saturated aqueous sodium sulfate solution and shaken twice with 25-ml portions of *n*-hexane. Following extraction, the aqueous phase was discarded, the combined *n*-hexane layers were dried over anhydrous sodium sulfate, and 3 or 4 μl aliquots were examined by gas chromatography. A gas chromatograph with on-column injection and a nickel electron-capture detector was used. The glass column (1.5 mm x 6.0 mm O.D.) was packed with 10% OV-1 on Chromosorb G-HP (80-100 mesh). Carrier gas was argon with 5% methane; flow rate, 40 ml/min. With a column temperature of 190° the retention times for dichlobenil, trifluralin, dinitramine, and triallate were 0.95, 2.85, 4.5, and 5.0 min, respectively. This procedure gave good resolution of the individual herbicides. Although resolution between dinitramine and triallate was not complete, adequate quantitative measurements could still be made. Recoveries of the 4 herbicides from the treated soils were all greater than 90%. Reproducibility was excellent. With this procedure, residues of dichlobenil, dinitramine, triallate, and trifluralin singly or in the presence of each other can be detected in a variety of soils at levels down to 0.5 ppm.

75-0487. Wolkoff, A. W.; Larose, R. H. (Dept. Environ., Canada Cent. Inland Waters, Burlington, Ontario, Canada L7R 4A6). **A highly sensitive technique for the liquid chromatographic analysis of phenols and other environmental pollutants.** *J. Chromatogr. 99:731-743; 1974.* (33 references)

This paper describes a highly sensitive technique for the analysis of phenols and other environmental pollutants by high-speed liquid chromatography. The system utilizes a reaction detector whereby cerium(IV) sulfate is allowed to react with phenols in the column effluent, and the cerium(III) thus produced is detected by fluorescence spectroscopy. The detector shows good linearity in the region 10-230 ppb of phenol, and combined with suitable concentration techniques, the lower limit of detection of phenol in environmental samples was shown to be about 0.4 ppb. Since many herbicides, fungicides, carbamate compounds, and organophosphate compounds contain a substituted phenol moiety, this technique may be applicable to pesticide determinations. (Author abstract by permission)

75-0488. Musty, P. R.; Nickless, G. (Dept. Inorg. Chem., Sch. Chem., The University, Bristol BS8 1TS, Great Britain). **The extraction and recovery of chlorinated insecticides and polychlorinated biphenyls from water using porous polyurethane foams.** *J. Chromatogr. 100(1): 83-93; 1974.* (8 references)

Porous polyurethane foams were used for the extraction and recovery of chlorinated insecticides and polychlorinated biphenyls (PCBs) from water. One liter of tap water was doped at the ppb level and elution of the adsorbed compounds was complete with 50 ml of acetone and 100 ml of *n*-hexane. Quantitative recoveries were obtained for the thirteen insecticides used, at a water flow-rate of 100 ml/min. The recoveries for PCBs were 40-99% at 100 ml/min. The amount of methylene blue adsorbed from aqueous solution by the foams was correlated with the efficiencies of six foams, of different surface areas and bulk densities, for adsorbing chlorinated insecticides and PCBs from water. (Author abstract by permission)

75-0489. Kovac, J.; Markova, V.; Kralik, P. (Res. Inst. Agrochem. Technol., Bratislav-Predmestie, Czechoslovakia). **Gas chromatographic determination of cholinesterase inhibition.** *J. Chromatogr. 100(1): 171-174; 1974.* (19 references)

A new enzymatic technique for toxicological study of the inhibition of cholinesterase activity has been developed. The amount of 2,4,5-trichlorophenyl acetate (used as substrate for the esterase) and/or of 2,4,5-trichlorophenol (the product of enzymatic hydrolysis) is determined by gas chromatography, with use of an electron-capture detector selective for organochlorine compounds. This method makes possible the use of small volumes (0.1 ml) to enhance the sensitivity of trace analysis for various pesticides in toxicological work. (Author abstract by permission)

75-0490. Lawrence, J. F.; Laver, G. W. (Food Res. Lab., Health Protect. Br., Health and Welfare Canada, Tunney's Pasture, Ottawa, Ontario K1A OL2, Canada). **Analysis of triazine herbicides by combined thin-layer chromatography and fluorimetry.** *J. Chromatogr. 100(1): 175-179; 1974.* (13 references)

The analysis of a number of *s*-triazine herbicides by combined thin-layer chromatography and fluorimetry is investigated. The method involves hydrolysis of the triazines in 1 *N* HCl to yield cyanuric acid and the corresponding alkylamines. The amines are coupled with Dns chloride (5-dimethylaminophthalene-1-sulfonyl chloride) to yield highly fluorescent compounds which are separated by thin-layer chromatography. The derivatives are quantitatively evaluated by fluorimetry after removal of the spots from the plate. A variety of food samples is successfully analyzed at concentrations at low as 0.05 ppm. The method also proves useful for the confirmation of triazines which have been analyzed by other techniques, such as gas chromatography. (Author abstract by permission)

75-0491. Anonymous. **(Kyoto Munic. Inst. Health, Kyoto, Japan). [A study on the biological determination of pesticide residues.]** *Kyoto-Toritsu Eisei Kenkyusho Kenkyu Nenpo (Annu. Rep. Kyoto Munic. Inst. Health) 40: 147; 1974.* (Japanese)

Soil samples were collected after the rice harvest from paddy fields treated annually with fenthion granules to control *Culex tritaeniorhynchus* and extracted with acetone after air drying. After condensing the acetone extract, it was mixed with 250 ml of water, and *Culex tritaeniorhynchus* larvae were put into the mixture. The mortality of the larvae after 24 hr was calculated to give the concentration of fenthion. Some extracts showed insecticidal activity greater than that corresponding to the residual amount of fenthion found by chemical analysis. This fact suggested the existence of some pesticide residues other than fenthion. In view of the experimental finding that some herbicides such as MO (CNP) and NIP (nitrofen) showed activity against the larvae of *Culex tritaeniorhynchus*, the recent decrease of mosquitoes may be related to the application of these herbicides.

75-0492. Van Peteghem, C.; Heyndrickx, A. (Dept. Toxicol., State Univ. Ghent, Ghent, Belgium). **Identity confirmation of chlorophenoxyacid herbicides residues.** *Meded. Fac. Landbouwwetensch. Rijksuniv. Gent 38(3):857-863; 1973.* (7 references)

Transesterification has been applied to the identity confirmation of chlorophenoxyacid herbicide residues.

GLC analysis with electron-capture detection yields a large number of peaks, one of which is attributed to a chlorophenoxyacid derivative. To confirm the identity, a derivation technique may be used wherein the peak vanishes and a new one, corresponding to the newly formed compound, emerges. Application of this method to commercially used herbicides, which are isooctylesters and propylene glycol butyl ether esters, results in the conversion to methylesters. In all cases transesterification was complete as no peak corresponding to to the original compound could be detected after derivation. Retention times of the methylesters were identical to those of standard solutions. The presence of water in the reaction mixture complicates the picture, thus drying the extract and using concentrated sulfuric acid are recommended in the technique. This proposed transesterification procedure is unsuitable for quantitative measurements with internal standardization by gas-chromatography. The lack of reproducibility may be due to loss by heat treatment, or by non-quantitative extraction from the acid layer.

75-0493. Van Hoof, F.; Heyndrickx, A. (Dept. Toxicol., State Univ. Ghent, Ghent, Belgium). **Thin layer chromatographic-spectrophotofluorimetric methods for the determination of dithio- and thiolcarbamates after hydrolysis and coupling with NBD-Cl.** *Meded. Fac. Landbouwwetensch. Rijksuniv. Gent 38(3):911-916; 1973.* (10 references)

A procedure has been developed for the hydrolysis of the dithio- and thiolcarbamates and the subsequent coupling of the liberated amines with 4-chloro-7-nitrobenzo-2,1,3-ozadiazole. The reaction products are strongly fluorescent and are separated on thin layer plates. This is a sensitive method for identification of most dithio- and thiolcarbamates. The maxima in fluorescence spectra of the pesticides studied are as follows: Ordram (molinate), 545 nm; Sutan (butylate), 525 nm; Tillam (pebulate), 535 nm; Eptam (EPTC), 520 nm; Vernolate, 520 nm; Ro Neet (cycloate), 520 nm; thiram, 525 nm; ferbam, 525 nm; and ziram, 525 nm. The minimum detectable quantities of the pesticides studied were: ferbam, 40 ng; ziram, 20 ng; Urbacid, 20 ng; thiram, 40 ng; and zineb, 100 ng.

75-0494. Ackermann, H.; Kretzschmann, F.; Krueger, S. (Zentralinst. Ernaehrung, Bergholz-Rehbruecke, East Germany). **Bestimmung von Chlormequat-(Chlorcholinchlorid)-Rueckstaenden in Milch. [Determination of chlormequat (chlorocholine chloride) residues in milk.]** *Nahrung 18(5): 541-544; 1974.* (4 references) (German)

A procedure for the extraction and thin-layer chromatographic determination of chlormequat (chlorocholine chloride) in cow's milk is described. Following fat removal by centrifugation, proteins are precipitated with trichloroacetic acid, after which lactose is eliminated by adding a 15:85 mixture of methanol and acetone. The remaining chlormequat is shaken with a dichloroethane-iodine solution to convert it into a periodide complex. Chlormequat is determined on a silica gel layer, using acetic acid, acetone and hydrochloric acid as a solvent system, and Dragendorff's reagent for visualization. The method is suitable for detection of chlormequat in the maximum allowable concentration of 0.05 ppm.

75-0495. Kretzschmann, F.; Ackermann, H.; Krueger, S. (Zentralinst. Ernaehrung, Bergholz-Rehbruecke, East Germany). **Bestimmung von Chlormequat-(Chlorocholinchlorid)-Rueckstaenden in pflanzlichen Geweben. [A method for determining chlormequat (chlorocholine chloride) residues in vegetable materials.]** *Nahrung 18(5): 545-550; 1974.* (3 references) (German)

Procedure for the extraction, cleanup and determination of chlormequat (chlorocholine chloride) in plant materials, including crops, is described. Following extraction with ethanol, the extract is purified (with chloroform in the case of extracts from wheat grains, and with distilled water, hydrochloric acid, and perhydrol in the case of extracts from straw). It is cleaned up further on a column packed with strongly acidic cation exchangers, using hydrochloric acid, and finally using iodine in 1,2-dichloroethane for elution to obtain a periodide complex. The residue determination is done on a silica gel layer, using a 85:10:5 mixture of acetic acid, acetone, and 25% hydrochloric acid as the solvent system and Dragendorff's reagent for visualization. The limit of detection, varying as a function of the maximum possible sample volume, amounts to 0.1 ppm for cereal grains and 0.3 ppm for straw. The rate of recovery ranged from 70 to 80%, and the analytical error is on the order of 20-30%.

75-0496. Mikami, A. (School of Forensic Med., Faculty of Med., Kanazawa Univ., Kanazawa, Ishikawa, Japan). **[Analytical method for the identification and determination of pesticides for forensic toxicological purposes.]** *Nippon Hoigaku Zasshi (Japan. J. Legal Med.) 27(5): 316-336; 1973.* (87 references) (Japanese)

The identification and determination of various pesticide residues in animal and human tissues was studied by enzymatic TLC and gas chromatography (GC). In enzymatic TLC, pig liver was found to be most suitable as the enzyme source. Using this method all organophosphorus and carbamate pesticides tested could be easily detected and nanogram amounts of pesticides could be determined. Gas chromatographic behavior of various pesticides was studied on a 4 × 2000 mm column packed with 1% SE-30. Forty five organophosphates, nine carbamates, and six organochlorine pesticides were satisfactorily separated. Analysis using GC and retention time values and color spots in TLC made it possible to identify various kinds of pesticides. For quantitative analysis, the specimens were extracted

with acetonitrile, then a mixture of *n*-hexane and ethyl acetate was added for partiion-extraction. Liquid-liquid partition extraction was very effective for detection of cyanox, carbaryl, and dieldrin. Organ levels of five pesticides administered p.o. to rabbits on their organs were analyzed by the present method. An analysis was carried out on the body fluids and organs of an elderly woman who died after ingesting of fenthion. The results were discussed.

75-0497. Kvalvag, J. (Chem. Res. Lab., Agr. Univ. Norway, Aas, Norway). **The detection and determination of residues of the herbicide nitrofen in vegetables.** *Analyst (London) 99(1183): 666-669; 1974.* (14 references)

A method for residue analysis, based on electron capture gas chromatography following cleanup on a sulfuric acid-Celite column, is presented. The limit of detection is 10 ng/g. Recoveries have been investigated for different kinds of vegetables. The extraction efficiency of acetonitrile versus dichloromethane was checked in a separate experiment. Spectroscopic data and results for the herbicide are included. (Author abstract by permission)

75-0498. Rickett, F. E. (Cooper Technical Bureau, Berkhamsted, Herts, England). **Preparative scale separation of pyrethrins by liquid-liquid partition chromatography.** *Pyrethrum Post 12(1): 28-31; 1973.* (13 references)

Pure samples of the six insecticidally active esters of pyrethrum have been prepared directly from pyrethrum extract. The system is based on liquid-liquid partition chromatography at elevated pressures. Columns were of the variable bed type. Two column configurations were used, the first emplying a main column 450x25 mm with a precolumn of 450x10 mm and the second, a main column 1,000x38 mm with a precolumn 450x25 mm. Chromatography was first carried out on the 450x25 column using nitromethane, supported on Celite, as the stationary phase with mobile phases of hexane and, subsequently, carbon tetrachloride-hexane (1:3). Better results were obtained by packing the column with the Celite slurried in nitromethane rather than hexane. It was possible to obtain good recoveries, about 60% for the pure esters. Identification of the pyrethroids was performed by gas chromatography. A short (1 ft. x 1/8 in) glass column packed with 1% OV-225 on 100-120 mesh Gas-Chrom Q gave adequate resolution of cinerin II and jasmolin II, while permitting a complete pyrethrum analysis in less than 4 min.

75-0499. Cox, J.; Donegan, L.; Pinegar, J. A. (Trop. Prod. Inst., Grays Inn Rd., London WCl X 8LU, England). **The estimation of surface residues of benomyl on treated bananas.** *Pestic. Sci. 5(2): 135-145; 1974.* (10 references)

A simple rinsing technqiue for the extraction of benomyl residues present on the skin of bananas, a microbiological assay and a u.v. spectrophotometric assay for its estimation are described. Use of these in a persistence study with benomyl on bananas showed good recovery by both methods. Preliminary work on plantation-treated bananas revealed that the benomyl was persisting unchanged and not decomposited to any appreciable extent during ripening and storage of the fruit. (Author abstract by permission)

75-0500. Inoue, Y.; Fukuhara, K.; Takeda, M. (Food Drug Safety Cent. Tokyo, Japan). **[Studies on analysis of pesticide residues in foods, part 16. Analytical method for residues of nine organophosphorus pesticides including dichlorvos and disulfoton in vegetables.]** *Shokuhin Eiseigaku Zasshi (J. Food Hyg. Soc. Jap.) 15(5): 337-341; 1974.* (5 references) (Japanese)

As part of a systematic analysis of organophosphorus pesticides, analytical procedures on nine such pesticides including the highly volatile dichlorvos and disulfoton were studied. The results of the study showed that it was necessary to use benzene or *n*-hexane as the extraction solvent when disulfoton was the object of analysis. It was necessary to use benzene as the transfer solvent from an aqueous acetonic solution when dichlorvos was the object of analysis. It was necessary to use 300 ml of eluting solvent for recovery of EDDP (*O*-ethyl diiphenyl phosphorothioate) from a charcoal column and the recovery of other pesticides was generally adequate. Using the present procedure for analysis, the recovery of the various pesticides added to several vegetables ranged from 54.5% for disulfoton on potato to 96.3% for parathion on green peas.

75-0501. Mirkhatov, T.; Ikramov, L. T. (Dept. Toxicol. Chem., Tashkent Inst. Pharmaceut., Tashkent, USSR). **Izolirovaniye, obnaruzheniye i opredeleniye ftalofosa v biologicheskikh ob"ektakh. [Isolation, detection and determination of phthalophos in biological materials.]** *Sud. Med. Ekspert. 16(2): 34-36; 1973.* (Russian)

A procedure for the isolation, detection, and determination of phthalophos (phosmet) residues in biological materials is described. Three-fold extraction with ether in a pH range of 1-5 without agitation was found most efficient for isolation. The ether extract is further purified by transferring the phthalophos residue into acetone and further by thin-layer chromatographic cleanup on silica gel. Chromatographic cleanup is a necessity for gastric and intestinal content samples. Following elution with chloroform from the silica gel layer, and transfer into ethanol, identification is done using alcoholic solutions of silver nitrate, mercury dichloride, mercury dibromide, and iodine chloride. The rates of phthalophos recovery from gastric and intestinal contents were 41-56% and 27-40%, resepectively.

75-0502. Stadnichenko, E. I.; Volkova, Ye. A. (Dept. Toxicol. Chem., Kharkov Inst. Pharmaceut., Kharkov, USSR). **Opredeleniye trikhlormetafosa pri khimiko-toksikologicheskikh issledovaniyakh. [Determination of trichlorometaphos in chemical-toxicological studies.]** *Sud.-Med. Ekspert. 16(4): 37-39; 1973.* (Russian)

A method for the detection and quantitative determination of trichlorometaphos (ronnel) in fresh liver samples is described. Following extraction with acetone and successive transfers to hexane, acetonitrile, and ether, the ether solution was spotted on chromatographic paper and developed with a 1:1:2 ratio of alcohol, acetone, and water. Half of the chromatogram was sprayed with sodium hydroxide in ethanol, then treated with 4-aminoantipyrine in an acetonic aqueous solution of potassium ferricyanide for identification. The other half of the chromatogram was treated with ammonium persulfate, *m*-nitrophenol, sodium hydroxide, sodium sulfite, sulfuric acid, ammonium molybdate, hydrazine sulfate, and tin chloride for photometric determination of trichlorometaphos. At a recovery rate of 87-92%, it was possible to determine 2 mg residue in 50 g liver sample.

The Administrator of the U.S. Environmental Protection Agency has determined that the publication of this periodical is necessary in the transaction of public business required by law of this Agency. Use of funds for printing this periodical approved by the Director of the Office of Management and Budget February 6, 1973.

Pesticides Abstracts is available on 16 mm microfilm. Additional information can be obtained from the Technical Services Division.

ORDER FORM FOR
PESTICIDES ABSTRACTS

To: Superintendent of Documents
Government Printing Office
Washington, D.C. 20402

Please enter my subscription for Pesticides Abstracts. I am enclosing Money Order ☐ Check ☐ for this subscription.
($18.25 a year; $4.60 additional for foreign mailing.)

Please address as follows: _____

_____

_____

UNITED STATES GOVERNMENT PRINTING OFFICE, WASHINGTON, D.C. 1968

For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. Subscription price, domestic, $18.25 a year, $4.60 additional for foreign mailing. Price for a single copy of this issue is $1.40, Index issue $2.35.

U.S. ENVIRONMENTAL PROTECTION AGENCY
OFFICE OF PESTICIDE PROGRAMS
Technical Services Division
Rm. EB-49, 401 M Street, S.W.
Washington, D.C. 20460

POSTAGE AND FEES PAID
ENVIRONMENTAL
PROTECTION AGENCY
EPA-335

Serials Department
Xerox University Microfilms
300 North Zeeb Road
Ann Arbor, MI 48106 EPA 18-1

If you do not desire to continue receiving this publication, please CHECK HERE ☐; cut off this label and return it to the above address. Your name will then be removed from the mailing list.